BRITISH BUTTERFLIES

PEEPS·AT·NATURE

PEEPS AT NATURE

EDITED BY
THE REV. CHARLES A. HALL

V. BRITISH BUTTERFLIES

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PLATE 1.

1. Swallow Tail
2. Black-veined White
3. Large Garden White (Female)
4. Small Garden White (Male)
5. Green-veined White (Female)
6. Bath White (Male)
7. Orange Tip
8. Wood White (Male)
9. Pale Clouded Yellow

BRITISH BUTTERFLIES

BY

A. M. STEWART

CONTAINING 16 ILLUSTRATIONS, FIGURING ALL THE SPECIES, VIZ.:

8 FULL-PAGE IN COLOUR

8 PAGES FROM PHOTOGRAPHS

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1918

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INTRODUCTORY EDITORIAL NOTE

I TAKE it that this little "Peep at Nature," needs no apology; the exquisite coloured plates, produced direct from natural butterflies by the three-colour process, are a sufficient justification of its appearance.

The author is a practical entomologist of many years' standing. He writes from the fulness of a rich experience in the fields. He justly advocates the "Paisley" method of setting insects. I know it to be the more expeditious, and less calculated to damage specimens, than the ordinary process. His notes on the preservation of larvæ will be welcome in many quarters.

The publishers desire me to express their indebtedness to Messrs. Watkins and Doncaster, 36, Strand, W.C., for kindly arranging and lending the specimens from which the coloured plates have been produced.

CHARLES A. HALL.

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* These eight illustrations are in colour; the others are in black and white.

BRITISH BUTTERFLIES

CHAPTER I

THE LIFE-HISTORY OF A BUTTERFLY

WHAT is the difference between a butterfly and a moth, and how am I to distinguish between them? is a question very often put to the student of insect life—the entomologist.

Butterflies and moths both belong to the Natural Order, *Lepidoptera*, or scale-winged insects. Butterflies may be distinguished as day flyers, and the moths fly by night. The main physical difference between them appears in the forms of the antennæ, or horns; in the butterflies these organs are club-shaped at the extreme ends. But the antennæ of the various species do not all follow a common pattern. In some the knob is abrupt and much smaller, after the manner of a drum-stick; in others, the thickening commences well down the shaft, and is gradually increased until it very much resembles an Indian club. The antennæ of the moths, on the other hand, show much diversity of form, and in a great many species they are totally different in the male and female. A very common and beautiful form

is the feathered, or comblike, antenna ; another is long and threadlike, and some show a combination of these two forms ; others, again, seem to be striving after the butterfly type, and approach the club shape. It should be noted that not a few moths fly during the day, but it is rare, exceedingly rare, to find a butterfly abroad after sundown. With a little practice in observation, the novice soon learns to distinguish between the two.

The stages of development of butterflies and moths are practically the same : first the egg ; next the caterpillar, or larva ; then the pupa, or chrysalis; and, lastly, the imago, or perfect insect.

The eggs of the Lepidoptera are surpassingly beautiful. Are they like birds' eggs ? Not at all ! In the first place they are too minute for comparison with the larger product of the birds ; both in colour and form they more nearly resemble small shells or pearls, as a great many of them are beautifully opalescent, especially when empty. A good hand-lens will reveal a great deal of their beauty, but the low power of an ordinary compound microscope will be necessary to enable you to see all the nice detail of pattern sculptured on their surfaces. Each species of butterfly, or moth, produces eggs of particular shape and ornamentation, so it is quite possible, in most cases, to say to which species an egg belongs. How long the egg may remain unhatched depends a good deal upon which butterfly's egg it is, the season of the year, and the temperature. Not many butterflies pass the winter in this country in the egg state, that season being usually passed either as

a half-fed hibernating caterpillar, or as a chrysalis; and in a few cases it is only the female which passes the winter in some secure retreat, to emerge again in the spring, and then deposit her eggs on the fresh-growing verdure. But, generally speaking, eggs laid during the summer hatch out in from ten to sixteen days. And it is well to be on the lookout for the young larvæ even earlier, if you intend to rear some species in confinement. If you have secured eggs to rear from, watch them from day to day to see if they darken, as they often assume a dark leaden hue immediately before hatching. This is a useful warning, and serves as a hint to have plenty of fresh food ready for the young family about to arrive.

The caterpillars are ravenous eaters; you will not notice this fact particularly at first, because they are then such tiny creatures, but in proportion to their size their eating capacity is enormous. They grow at an exceedingly rapid rate and to such an extent that they literally burst their skins! In a very short time—three or four days—the old skin bursts and out comes Mr. Caterpillar with a brand-new one. And this is the manner of their growth; several times (five or six) this skin-shedding process is repeated. And then the creature prepares for the last and final change before turning into a butterfly.

There are one or two more points I would ask you to notice about our caterpillar ere we pass on to consider his next stage. The legs are generally sixteen in number. There are six true legs, one pair on each of

the first three body-segments behind the head; four more pairs near the anal end, and the last segment carries another pair, known as the "anal claspers." The first six may be said to represent the same legs in the perfect insect. Note also the breathing holes, or spiracles, placed in a row along either side of the larva. The head *seems* to carry very large eyes, but it does not really do so; the real eyes are very minute, and it requires a good strong pocket-lens to make them out. There are twelve of them all told, and they are not all of equal size. There are six on either side of the mouth, and the three larger ones on each side are not very difficult to find. The mouth is furnished with strong mandibles for biting and chewing food, and also contains the spinneret for the production of the silk used on various occasions. All these details should be carefully noted—the head, the eyes, the breathing spiracles, the mandibles, the fore-legs and claws, and the hind- or pro-legs. Mark the totally different types of feet which terminate these two sets of legs. You will need to use your lens for this observation, and to enable you to see the beautiful structure of the pro-leg foot, it will be necessary for you to examine it through a compound microscope. It is well for the young entomologist to know these more prominent features of a caterpillar's economy, if for no other reason than to be able to answer the questions that are sure to be put to him on these and many other points.

But only a small percentage of the larvæ that are born into the world live to become butterflies; some

seasons a larger number than usual may escape, and then we have a butterfly year, but the relentless ichneumon flies soon restore the balance. They, too, have their young to provide for, and a strange mode of existence they have. Once you get to know these ichneumons at sight, you will be astonished at the number of them. All the summer through you will find them hawking about the trees, bushes, nettles, and heather, and, indeed, wherever larvæ are to be found, there, too, you will find these flies. There are many species of them. Once a female has discovered a larva its doom is sealed. The ordinary larva has very few defensive weapons; he may wriggle and squirm and *look* terrifying, but all the same the ichneumon sets about her task of placing one or two, and in many cases a dozen or two, of her eggs either upon or under his skin. These eggs soon hatch, and the little white maggots pass their existence inside the doomed creature, eating all the tissues away, at first avoiding the vital organs, which they leave until the last. When they have reached their allotted span, and are about to change to the pupa state themselves, they soon finish off their victim, and all that remains of what might have been a brilliant butterfly is a little shrivelled bit of skin and a host of little—or it may be a few big—black, brown, or grey flies. Sentiment apart, these parasitic flies are extremely useful. When you consider the large number of eggs laid by a single female butterfly or moth—from two to six hundred is a fair average—you will realize that if this enormous progeny were to survive and go

on increasing without any check, the vegetation of the world would very soon prove quite inadequate to support the vast army of caterpillars, to say nothing of you and me.

You may at some time find a dozen or two larvæ of some particular species of butterfly or moth, and at the time of collecting them they may seem healthy and all right, but weeks afterwards you may discover that only a very small number will change to chrysalids, the ichneumons having had the rest. If you can catch and induce a female butterfly to give you a batch of eggs in captivity, *then* you may be sure, providing your treatment of them has been right, that all your brood will arrive at the perfect state.

The next stage we have to consider we will pass over briefly. The change from the larva to the chrysalis is always a very fascinating performance to watch, not that one could sit and see the whole performance right through from start to finish, the time occupied is too long for that. Generally the process lasts a day or two, but by watching at frequent intervals, where several individuals are engaged at the same operation and each at its own stage of the work, it is not difficult to follow the whole process of the transformation. Try it with the larva of the Large Garden White butterfly, perhaps the commonest, and therefore the easiest to procure; you will gather plenty of "stung" or "ichneumoned" examples, but still a sufficient number should be clean to serve your purpose.

We will not enter into all the details of the "spinning-

up" process and describe how an attachment is secured at the anal extremity, and how our little friend "loops the loop." Some species, such as the Tortoiseshell, get over this part of their difficulty by omitting the loop altogether, and therefore hang head downward, suspended only by the hooks and silk at the tail. Concealment during this stage is the creature's only hope and chance of survival; other defence they have none. Their colour may occasionally protect them by virtue of making them harmonize beautifully with their surroundings. The ichneumons seldom molest them during the chrysalis stage; but birds and small animals have sharp eyes when foraging for food, so it is usually far more difficult to discover these chrysalids than to find the feeding caterpillars.

The time passed as a chrysalis is very variable; ten days to a fortnight in summer is sufficient for many species; others pass over the whole winter, like the spring brood of our common white butterflies, so that these can be sought for during the winter months under the overhanging portion of palings, walls, outhouses, and in similar situations. The cold does not seem to injure them; it may, and generally does, retard their emergence, and possibly has some effect on the colours of the wings, but it cannot change their ultimate pattern. Experiments have been tried with various chrysalids, part of a brood being hatched out after being submitted to a very low temperature, and another part of the same brood after being treated with a high temperature. Speaking generally, the coloration of those subjected

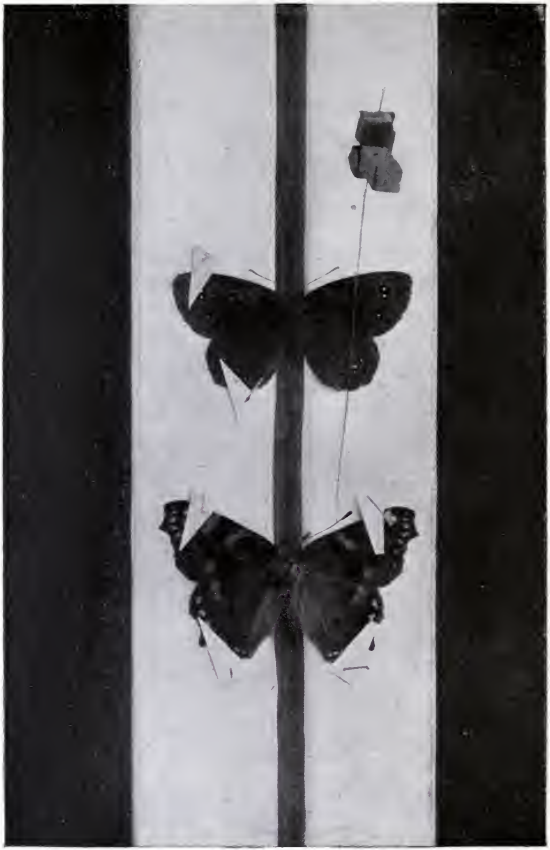
to the cold treatment was brightened and intensified, and Nature does the same thing in her own way. The early summer butterflies, which pass through the winter as chrysalids, are almost invariably larger and brighter than the midsummer or autumn brood of the same species.

But suppose our caterpillar to have successfully run the gauntlet—ichneumon, bird, beast, and beetle—and to have become a healthy pupa, and that the time has arrived when he must make the last and greatest transformation in his short and interesting career. Several days prior to his exit as a butterfly taking place, a noticeable change occurs in the apparent colour of the chrysalis.

As a matter of fact it is not the chrysalis shell which is changing colour, but the developing insect, the colours of which are beginning to show through it, at first rather faintly ; but latterly the pattern of the wings can be distinctly seen, and the whole body surface gets darker. When this stage is reached, the advent of our butterfly is not long delayed. The hour chosen is usually early in the morning, so that by the time the sun is high and the fresh perfumed flowers are nodding in the breeze, our little butterfly has expanded and dried his wings, and is now quite prepared for the beautiful and consummating act in the wonderful drama of his existence.

While he is drying his wings and preparing for a life amongst sunshine and flowers, we might spend a few minutes with him ere he leaves us, and the more so, as

PLATE 2



Method of Setting with Bristle and Braces

now he looks his very best, arrayed in all his new-found finery. Such wings! no wonder he looks proud as he slowly opens and closes them, repeating this action over and over again as if to prove their smooth working before he launches forth upon the air.

And the wonderful pattern of these wings is all built up of tiny scales placed as regularly as the slates on a roof. Your pocket-lens will show you much of this, but to examine the individual scales, their various shapes and structure, you will require a compound microscope. These scales are the "dust" you will find on your finger and thumb if ever you pick up a butterfly in such an unscientific manner. You will notice, too, that the under sides of the wings bear quite a different design from the upper sides; this is nearly always the case, and in many foreign butterflies this difference between the two sides is so very remarkable as to be quite startling in its effect. Well I remember an old sergeant-major, who had spent many years in India, and had done a lot of "butterfly dodging" in his day, telling me of this wonderful effect. He said one would come upon an open piece of meadow-land blazing with flowers and butterflies, but, on being disturbed, the whole crowd of insects would rise in the air, and then, he would say, they looked like a different set altogether. When you capture a few specimens of any species, examine closely the under sides, and in any case, if you wish to preserve them, always set one of each sex with the under side uppermost.

Next to the wings the head claims our attention; it

supports three very essential organs—the eyes, the horns, or antennæ, and the tongue, or sucker.

The antennæ are undoubtedly the organs of smell, which is perhaps the most highly developed sense in the Insect World. That the eyes are a marvel of beauty, and that the tongue is a finely finished little instrument for its work no one can question; but the sense of smell has a much longer range than even the eye, with all its facets. And you will generally find, in relation to the faculty which any animal or insect has to exert most so as to procure its food and propagate its kind, the organ of that faculty reaches the highest point of development and service.

The eyes of the condor and the gannet must be marvellous in range and penetrating power. I have watched scores of the latter birds sailing and hovering 150 feet and more above a troubled sea. Suddenly there would be a slight pause, and then a rocket-like dive right down into the waves below. To see a fish on the surface from such a height would be a great feat, but to see and catch one a dozen feet deep in a broken sea as a gannet can do, is wonderful indeed.

With butterfly and moth the sense of smell is of the greatest importance. Their vision is good, but short in range; so to find the flowers wherein lies their food the sight is good, but the power to detect them by scent must be far better. "Over the hedge is a garden fair," and if a butterfly cannot see through the hedge, he can at least smell through it. He could fly over it?

Yes, but if his sense of smell says there is nothing there for him, you see he is saved the time and trouble ; and his life is short.

"Assembling" and "treacling" for moths are two methods employed by insect-hunters to secure an abundance of specimens otherwise difficult to obtain, and in both cases it is this same wonderful sense of smell which is the insect's undoing.

For "assembling," a captive virgin female is taken at dusk to the locality where the species is likely to occur, and if males are about they very soon make their appearance. The female being in a gauze-covered box, they will swarm over it in their efforts to find an entrance, and when thus engaged can be easily captured. As for the subtle odour emitted by the lady, you or I could never detect it, yet these moths come swarming from far and near. I once witnessed a curious phase of this instinct on a hillside in Arran. My attention was arrested by a number of males of *Bombyx Quercus* (variety, *Callunæ*), keeping near and flying over a certain spot, and, thinking a female might be about, I went over to investigate. It was a female, but a dead and crushed one ; how it had met its end I could only conjecture ; but evidently, although the insect was mutilated, the scent still lingered, and brought the males circling round. This large moth flies boldly during the day, and in Arran the larvæ feed on the heather.

The eyes of a butterfly are large and of the usual insect pattern—*i.e.*, compound, being made up of a number of tiny lenses, hexagonal in shape, like the

honeycomb of the domestic bee. Roughly, about three thousand of these lenses go to make up the two eyes. As pointed out, their range of vision is comparatively short, but within their range vision must be very keen —before, behind, above, and below. I once saw a sparrow try to capture a Large Garden White in a street in the town; he darted at it again and again, much in the manner of the ordinary spotted flycatcher, but the butterfly seemed to have no difficulty in evading him, and eventually he gave up the game.

A small portion of the eye makes a good slide for the microscope, but the individual lenses are hardly visible through an ordinary hand-glass. On the top of the head are one or two small simple eyes, which do not look as if they could be of much service, but one never knows, and the butterflies will not tell, although they have long tongues.

The tongue is a very pretty structure; when not in use it lies coiled up in spiral fashion like a watch-spring, and is then well protected by two little side-covers called the "palpi." Needless to say, the tongue cannot sting. No moth or butterfly has a stinging organ; the tongue is too delicate for any "cut and thrust" work. It is not difficult to mount a butterfly's tongue for the microscope, and its examination well repays the trouble. Particularly noticeable under the microscope are the little bell-shaped suckers placed in long rows near the tip. If you wish to make and examine a cross section, take the head of a freshly killed specimen and extend the tongue in a little melted paraffin wax;

when this is thoroughly set, cut it across in very thin slices with a sharp razor; place one on a glass slide, then on to the microscope stage, and there you are! You will soon discover that the simple-looking tube is a very complicated affair, and quite a little study in itself.

We will not linger over what remains of the anatomy of our butterfly. The legs are six in number, but occasionally the first pair are useless for walking, and only the middle and last pairs are fully developed. Always remember the maximum number of legs for all insects is six. Caterpillars may have more or less; they occur as footless grubs with no legs at all, while some have as many as sixteen legs.

The last, or abdominal, section of a butterfly's body carries the sexual organs; it is usually more slender in the males than in the females.

CHAPTER II

THE CAPTURE AND PRESERVATION OF BUTTERFLIES

In the rearing of butterflies from eggs and in watching them all through their larval stages, we learn a great deal concerning their life and habits, and finally secure perfect specimens for the cabinet. But the glories of the chase and the charm of the country ramble weigh more in the balance with the naturalist, and the story of a captured specimen is often far more interesting than the record of a bred one.

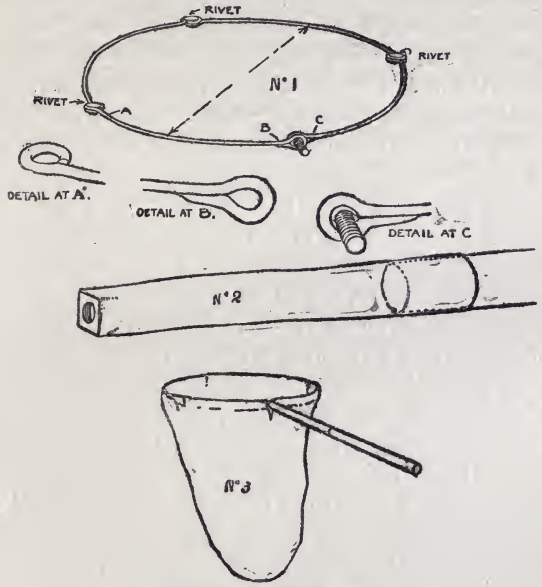
Capture and Preservation of Butterflies

Of butterfly nets used in the chase there are many and varied patterns in the market. I made my own and a better balanced one it would be hard to find. Having seen and handled a few in my time, my experience has been that they are mostly too heavy, have too many loose parts, and their weight is badly distributed. Indeed, I saw one lately which felt more like a hammer in one's hand. I think if you try to get one made after the pattern here described and figured on p. 15, you will not be disappointed with it.

Now, it is one of the avowed purposes of this little book to make the study and collecting of butterflies cost *all* the time a boy can spare, and little, or, at least, not much in money. The requirements for a ring folding net are 2 yards of steel wire, rather less than $\frac{1}{8}$ inch in thickness (cost about threepence); three copper rivets and washers, $\frac{3}{16}$ inch by $\frac{3}{8}$ inch long (cost one penny); one $\frac{1}{4}$-inch iron screw-head bolt and nut (one penny). Cut the wire into two pieces, each 20 inches long, and two pieces 16 inches long. If you can get a tinsmith friend to turn the eyes for you, so much the better; you will thus avoid the most difficult part of the operation, but you would lose some valuable lessons and the satisfaction of having made the whole thing yourself.

The accompanying cut will show you how the eyes are turned and riveted, and how the nut is fixed in the tube which the tinsmith will make for you, and he will also solder the nut in the narrow end for a few coppers. Or you can get him to make the whole

concern, as I have done for a friend of mine. I simply gave the tinsmith mine for a pattern, and in a



DETAILS OF FOLDING-NET.

1, Ring open, about 16 inches diameter; 2, tin tube with nut soldered in at narrow end; 3, net complete, showing wooden handle fitting into tin tube. Detail A shows how eyes are turned; B, larger eye for passing over screw; C, screw soldered in position.

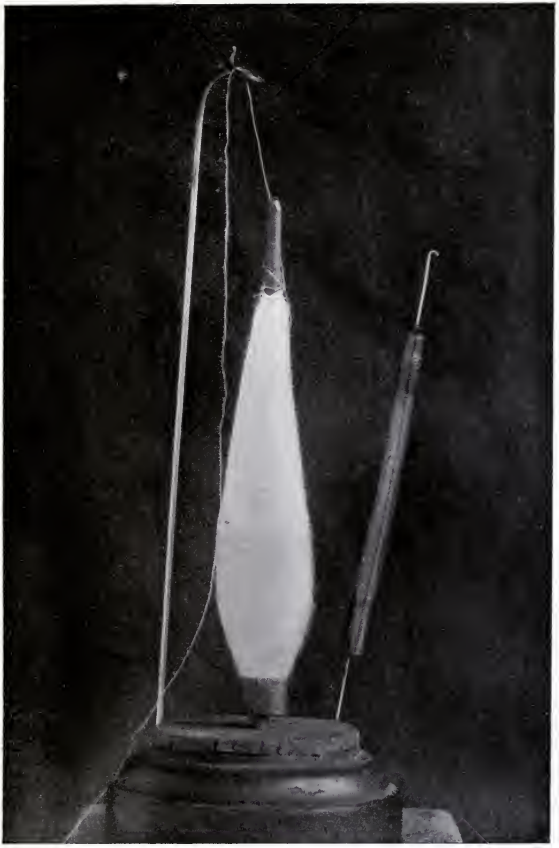
few days he handed me over an exact duplicate, and only charged one shilling and sixpence for it.

The net itself is easily made. You will need 1½

yards of the best and strongest muslin and a piece of stout twilled cotton, with which to make the hollow binding round the wire for strength. This binding must be at least 2 inches deep, so as to slip off and on the ring easily when you wish to repair the ring or wash the net. Get green muslin if you care for it; I tried green, too, but speedily gave it up, as I found the white net more effective for seeing and handling moths in after dark.

Do not shape the net down to too fine a point; rather make it more of a cup-shape and nearly the depth of your arm. And, lastly, while we are on the subject of the net, always carry a few strips of gum paper with you on an excursion; they are very handy and effective for repairing a damage, say, after contact with a bramble-bush.

Most butterflies are very impatient in the net, and strongly resent their imprisonment, so either double your net over the instant a capture is made, or catch the net by the neck, so to speak, with your left hand, leaving your right free for the pinching process. Pinching must be very carefully done, or your specimen may be spoiled. It can be done only when the wings are closed; you give the insect a sharp nip between your finger and thumb nails, right under the junction of the wings and the body—*i.e.*, on the under side of the thorax, always taking care not to crush or mangle the specimen. Do not attempt to actually kill it; just give a sufficient pinch to stun it; then you may open the net, remove your specimen, and pin it in your



"Cop" of "120's" Cotton on Stand, and Setting-Needle for "Paisley" Method of Setting

collecting box, which should be as nearly air-tight as you can make it, and lined with sheet cork. Place some freshly pounded laurel-leaves secured in a piece of muslin at one end of your box. The fumes given off by the bruised leaves soon kill the insects. Don't use ammonia for killing butterflies ; it alters their colours, and, in fact, ruins some altogether. Cyanide of potassium or laurel-leaves are the best killing agents, and the latter are by far the safest for boys to handle, as cyanide is very poisonous.

Specially-made entomological pins can be purchased from all dealers in naturalists' requisites. Black enamelled pins are the vogue just now, and they last longer than the silvered or gilt ones, and resist "grease" better. Many insects, you should know, have a small, and some a large, amount of oil in their bodies, which gradually makes its presence seen, first in the abdomen, and later it spreads (if not checked) to the wings. The oil, coming in contact with the white or yellow pin, soon corrodes it through ; the black enamel resists its action longest. Try to check this "greasing" of your specimens on its first appearance on the body, and if you notice it before it has spread to the wings all may be well. Break the abdomen off at once, and drop it into benzine, where you can let it remain a day or two. Then transfer it to a box of fine dry plaster of Paris for another day or so, and you will be surprised how beautiful and clean it will come out. Another hint : Push a little pin into each body when broken off, and attach a *white* thread to the pin ; now you can do

what you like with the body without touching it with your fingers; lastly, replace each body, sticking it in position with a dab of entomological gum, to be had from Messrs. Watkins and Doncaster, 36, Strand, W.C.

Supposing you have arrived home with a few butterflies, and wish to set them. This is best done as soon as possible after they are killed. They may remain unset a few days if kept damp and yet properly aired; you must prevent them from hardening on the one hand, and getting mouldy on the other, through too long and close keeping; so have a watchful eye on them until set.

Setting-boards can be either bought or made. This is a question for each worker to determine for himself. Some collectors may have special facilities for making them, while others may have a profusion of pocket money wherewith to buy them. When I was a boy I made my own. It was a work of necessity. As a lad I had always so many specimens to set in summer-time that it would have been sheer ruination to have bought all the boards required.

On Plate II. you have an illustration of a setting-board, and the photograph is in itself an indication of how butterflies are to be set before being placed in the permanent collection. Note the setting-bristle mounted in a cube of cork. This is used to hold the wing in position while the card braces are being placed. The collector can easily mount a bristle for himself. A cat, badger, or other whisker will serve; do not try to push

it through the cube of cork, but glue it between two pieces ; by doing so you will save your bristle from being spoiled and make a firmer job.

Keep your old *thin* postcards, from which to cut braces, and always have a boxful of various sizes handy, and in the same box, in a separate compartment, have an abundance of small, thin pins. Good setting, like other operations, is largely a matter of practice. Be careful not to injure the wings in any way, and place your braces on them so that they will not leave marks. I find a common fault with beginners is that they do not lower the specimen far enough down into the groove of the setting-board, with the result that the wings are bent and deformed by the braces pressing them down. See that the wings of your specimens lie flat and naturally spread out over the surface of the board on either side of the groove.

A setting-needle is sometimes an exceedingly useful tool. A very neat one can be made in a few minutes with a goose quill, a little sealing-wax, and the finest sewing-needle you can secure. Melt the wax and fill one end of the quill for half an inch or so, heat the eye end of the needle until nearly red-hot, and push it into the wax. This tool is very useful for adjusting a wing as occasion demands.

Let your insects remain as long as possible on the boards ; they should be left on for a fortnight in warm, dry weather, but longer in the spring and autumn. The wings of imperfectly dried specimens are liable to spring up, or droop.

There is another method of setting Lepidoptera which only requires to be more widely known to quickly supersede the use of braces and bristle. It is sometimes called the "Northern" method, but I prefer to call it the "Paisley," because it was first used in that town. Its advantages are: Greater speed, less apparatus, less expense, and less liability to damage the specimens. Instead of the usual setting-board, a block is used—that is to say, your setting-boards are cut up into short pieces, in length a little less than the width of the board. Thus, a board $2\frac{1}{2}$ inches wide should be cut into pieces $1\frac{3}{4}$ inches long. As no corked surface is needed these blocks can be made or bought very cheaply; the usual cost, from a joiner, is about two shillings per hundred. The only other requisite is a cop of very fine cotton "120^s" or even finer if you can get it. This you will be able to obtain from a cotton-spinner or his agent; by-and-by, as this method of setting becomes more widely known the dealers will probably stock a few of these fine cotton-yarn cops.* Plate III. will show you how to construct a stand for the cop. The rest is easy. Pin your insect in the same way as you would do for braces; place it on the block with wings well down on its surface, holding the block in your left hand. Give your cotton a turn round the extreme edge of the block, then bring it directly above your insect. Now blow the

* Readers desirous of adopting this most excellent method of setting, and yet experiencing difficulty in getting suitable cotton-yarn, should communicate with the author, Mr. A. M. Stewart, 38, Ferguslie, Paisley.—EDITOR.

wing on the left side as far forward as you wish it to go, and, while it is held extended by your blowing, bring the cotton down gently across it and there you have it, secured in position. Give two or three extra turns to hold it safe and repeat the operation for the other wing. If the wings should be stiff and refuse to go far enough forward, secure them as far forward as they will blow, with one turn of the cotton only, then gently assist them farther with a setting-needle. When in a satisfactory position, give the few extra turns of the cotton. I can set from sixty to one hundred and twenty insects in an hour by this method.

In removing an insect from a block, draw a sharp knife across the back of the block and lift off *all* the cotton at once. If the body of the specimen being set needs support, as sometimes happens, give the cotton two or three cross turns, and with your setting-needle raise the body on to this as shown on Plate VI. One hint more: See that your lines diverge from near the body at the bottom to near the tip of the wings at the top; the reason for this is that if you have to slip the wing forward under a turn of the thread it will not be damaged if the thread is arranged as indicated, whereas if your thread be laid on, say, from the outer bottom corner in towards the head, it would then scrape the wing, and be sure to remove some of the scales, thus damaging the specimen. The correct method is shown on Plate VI. With ordinary care and usage a good cop should last a year or two.

After your insects are set, by whatever method, they

need to be put aside in a dry, airy place to harden, and be secured against the ravages of mice and spiders. For their better protection, it is usual to place them in a "drying case," which need not be an elaborate affair. My drying case was constructed out of an empty box obtained from the grocer ; judging from the legend on the outside it had once contained tins of preserved apples. This is set up on end with the bottom removed and made into cross shelves. Light muslin cloth is tacked on in place of the bottom, so as to admit air but exclude dust. On the front, where the lid was originally nailed, is a hinged frame, covered with the same material, acting as a door. This drying house is not exactly pretty, but it has served its purpose admirably for many years.

A representative of the larva of each species is now considered essential to a complete collection of butterflies, and it is rendered even more perfect if egg-shells and chrysalis cases can also be included.

We now have a fairly easy and reliable process for preserving larvæ, a process which any aspiring young collector can carry through without much trouble or expense. It is really very simple and costs little. True, one can purchase apparatus specially made for the work for ten, or even five, shillings, but equally good results can be obtained with the expenditure of a few pence and a little ingenuity. I strongly advise young folk to make their own apparatus ; by so doing they develop resourcefulness, and a handy youngster is not likely to make a failure of his life.

In the first place you will need a hot-air chamber. Any empty toffee-tin will serve this purpose; one somewhere about 6 inches long by 4 inches in diameter will be a handy size. Get a piece of copper or soft iron wire, such as milliners use; give the wire two or three turns round the tin, twisting it as tightly as you can: then give the two free ends a turn or two round a gas-bracket near the burner, so as to bring your tin, with the open end next you, just over the burner. Or you may mount the tin over a spirit-lamp, in which event you will not be troubled with soot gathering on the outside of your oven. You now have an oven which you can make as hot as you want it by regulating your flame; you will soon discover the right temperature in which to dry a skin quickly without burning it. The skins of small, thin-skinned caterpillars dry very quickly, whilst those of large moths, such as the Oak Eggar, dry more slowly even with more heat.

Your next requirement is a glass blowpipe: this you can purchase at the chemist's for a copper. Ask for a glass tube about a foot long and a quarter of an inch in diameter. Now, this tubing is made of a very soft and pliable kind of glass, and by heating it over a flame you should have no difficulty in drawing out one end of the tube into a fine point, not too long and not too abrupt; the illustration (Plate VII.) will show you the right length of the point. Hold the end over the gas-jet, keep turning it round, and in a minute it will become red and soft; remove the end of the tube from the flame, grasp it with a pair of forceps, and gently

and steadily pull the heated portion until it is drawn to a point of the required length. Nip off the part you caught with the forceps, and your tube is ready. Or another way is to heat the tube in the middle, and pull the two ends apart; this will give you two blowpipes, and you can make a fine point to one for small caterpillars and a wider aperture to the other for large ones. I used to know a friendly chemist who would "point" as many tubes as I wanted at his Bunsen burner in a few minutes. To complete your blowpipe, you will need about 2 inches of a watch-spring—any watch-repairer will give you a broken spring. The photograph on Plate VII. shows how the piece of spring is placed and used; it is bent to the required shape while heated, and bound in position with fine copper wire. The wire I use is the same as that required for mounting dried larva skins; it can be obtained at any shop where electrical appliances are sold; it is an extremely fine wire covered with green silk thread.

Your larva-preserving outfit is completed with a sheet of blotting-paper and an ordinary lead pencil. I will now describe the process.

There could be no better species to begin with than the caterpillar of the Large Garden White butterfly; get one as nearly full-grown as possible, lay it out on the blotting-pad before you, place the lead pencil across it gently, but firmly, just behind the head, and roll it towards the tail. This kills the larva instantly, and empties out its internal organs by the anal orifice. Roll your pencil over it again to make sure the skin is

PLATE 4.

1. Clouded Yellow (Male)
2. Brimstone (Male)
3. Silver-washed Fritillary (Male)
4. Dark-green Fritillary (Male)
5. High Brown Fritillary
6. Queen of Spain Fritillary
7. Small Pearl-bordered Fritillary
8. Pearl-bordered Fritillary
9. Greasy Fritillary

thoroughly clean inside; then insert your blowpipe into the anal orifice, letting the spring down on the last segment so as to hold the skin on; apply your mouth to the other end of the blowpipe, blow the skin out gently, and insert in the hot-air oven. Keep blowing gently for a few seconds; watch progress; touch the skin with your finger to see if it is getting hard and dry. Don't blow too hard and make it look like a bursting sausage; try to keep it as natural in appearance as possible. In a few minutes it will be quite hard and dry; when dry, raise the spring, and a slight touch with the thumb-nail will liberate it from the blowpipe. The skin is now ready for mounting on silk-covered wire or a thin dry twig with a little entomological gum or seccotine. Our specimen is now ready to take its place in the collection.

We now have to face the problem of storing the collection. It is probably beyond the means of a young collector to purchase a cabinet with drawers, costing ten shillings per drawer, and he will be well advised to keep his specimens in store-boxes which he may be able to make for himself. I made some very serviceable ones with scented soap-boxes got from our grocer. Any size will do, but it is best to have your boxes all of one size if possible, say 10 inches by 14 inches by 4 inches. Get a few light deal boxes about these dimensions, nail on the lids, paper them all over the outside with good stout brown packing-paper having a glossy surface; paste it on with thin glue; set aside a day or two to dry. When dry, take a sharp saw and

cut the boxes round the sides and ends, so that each box is divided into two equal traylike halves. Glue a stout cardboard shell round the inside of one half, and attach the other half by two small brass hinges. The cardboard shell rises above the sides of the tray, and when the other half of the box is folded over it "stays put," as the Yankee says; and, in addition, you have a fairly air-tight construction. These store-boxes fold after the manner of a book-form chess or draught board. Each half requires to be lined on the inside with sheet cork, which you can get from dealers in entomologists' sundries, and finally covered with thin white paper. Such a store-box costs less than one and sixpence. Keep two or three boxes for duplicate specimens, and as many for your permanent collection. By-and-by you will want glass-topped cases, but by the time you have arrived at that stage you should have gained sufficient experience to enable you to know where to buy them.

See that every specimen before being transferred to your permanent collection bears with it a small label setting forth the date and place of capture, thus:

EPPING, 9/6/11. *J. Roberts.*	ABBEY WOOD, HERTS, 7/9/11. *Robertson.*

Keep these tickets as inconspicuous as possible and with the writing or printing in such a position as to be easily read without requiring to remove the insect.

The following list of British butterflies is thoroughly modern, and in labelling your specimens you should

adopt its nomenclature, and also follow the order given in arranging your collection. Both Latin and English names are included, but if you wish to be a thorough entomologist you should accustom yourself to use the scientific names. The Latin name is the same everywhere "from China to Peru." If you use an English name of a butterfly in writing to a foreign collector he will probably fail to recognize the species referred to, but if you give the scientific name he will know it at once.

LIST OF BRITISH BUTTERFLIES

ARRANGED IN THEIR FAMILIES AND GENERA, WITH THEIR SCIENTIFIC AND POPULAR NAMES.

Family: PAPILIONIDÆ.

Papilio machaon.
SWALLOW-TAIL.

Family: PIERIDÆ.

Aporia cratægi.
BLACK-VEINED WHITE.

Pieris brassicæ.
LARGE WHITE.

Pieris rapæ.
SMALL WHITE.

Pieris napi.
GREEN-VEINED WHITE.

Pieris daplidice.
BATH WHITE.

Euchloë cardamines.
ORANGE-TIP.

Leucophasia sinapis.
WOOD WHITE.

Colias hyale.
PALE CLOUDED YELLOW.

Family: PIERIDÆ—*continued.*

Colias edusa.
CLOUDED YELLOW.

Gonepteryx rhamni.
BRIMSTONE.

Family: NYMPHALIDÆ.

Argynnis selene.
SMALL PEARL-BORDERED FRITILLARY.

Argynnis euphrosyne.
PEARL-BORDERED FRITILLARY.

Argynnis lathonia.
QUEEN OF SPAIN FRITILLARY.

Argynnis aglaia.
DARK GREEN FRITILLARY.

Argynnis adippe.
HIGH BROWN FRITILLARY.

Family : NYMPHALIDÆ — *continued.*

Argynnis paphia.
SILVER-WASHED FRITILLARY.

Melitæa aurinia.
GREASY FRITILLARY.

Melitæa cinxia.
GLANVILLE FRITILLARY.

Melitæa athalia.
HEATH FRITILLARY.

Vanessa c-album.
COMMA.

Vanessa polychloros.
LARGE TORTOISESHELL.

Vanessa urticæ.
SMALL TORTOISESHELL.

Vanessa io.
PEACOCK.

Vanessa antiopa.
CAMBERWELL BEAUTY.

Vanessa atalanta.
RED ADMIRAL.

Vanessa cardui.
PAINTED LADY.

Limenitis sibylla.
WHITE ADMIRAL.

Family : APATURIDÆ.

Apatura iris.
PURPLE EMPEROR.

Family : SATYRIDÆ.

Melanargia galathea.
MARBLED WHITE.

Erebia epiphron.
MOUNTAIN RINGLET.

Erebia æthiops.
NORTHERN BROWN, OR SCOTCH ARGUS.

Family : SATYRIDÆ — *continued.*

Pararge ægeria.
SPECKLED WOOD.

Pararge megæra.
WALL BROWN.

Satyrus semele.
GRAYLING.

Epinephele janira.
MEADOW BROWN.

Epinephele tithonus.
SMALL MEADOW BROWN.

Epinephele hyperanthus.
RINGLET.

Cœnonympha typhon.
MARSH RINGLET.

Cœnonympha pamphilus.
SMALL HEATH.

Family : LYCÆNIDÆ.

Thecla betulæ.
BROWN HAIRSTREAK.

Thecla w-album.
WHITE-LETTER HAIRSTREAK.

Thecla pruni.
BLACK HAIRSTREAK.

Thecla quercus.
PURPLE HAIRSTREAK.

Thecla rubi.
GREEN HAIRSTREAK.

Polyommatus dispar.
LARGE COPPER.

Polyommatus phlæas.
SMALL COPPER.

Lycæna bætica.
LONG-TAILED BLUE.

Lycæna ægon.
SILVER-STUDDED BLUE.

Family : LYCÆNIDÆ — *continued.*

Lycæna astrarche.
BROWN ARGUS.

Lycæna icarus.
COMMON BLUE.

Lycæna bellargus.
CLIFDEN BLUE.

Lycæna corydon.
CHALK-HILL BLUE.

Lycæna argiolus.
AZURE BLUE.

Lycæna semiargus.
MAZARINE BLUE.

Lycæna minima.
LITTLE BLUE.

Lycæna arion.
LARGE BLUE.

Family : ERYCINIDÆ.

Nemeobius lucina.
DUKE OF BURGUNDY.

Family : HESPERIDÆ.

Syrichthus malvæ.
GRIZZLED SKIPPER.

Nisoniades tages.
DINGY SKIPPER.

Hesperia thaumas.
SMALL SKIPPER.

Hesperia lineola.
ESSEX SKIPPER.

Hesperia actæon.
LULWORTH SKIPPER.

Hesperia sylvanus.
LARGE SKIPPER.

Hesperia comma.
SILVER-SPOTTED SKIPPER.

Carterocephalus palæmon.
CHECKERED SKIPPER.

The remaining pages of this volume will be devoted to a description of the species mentioned in the foregoing list, together with notes on habits and other points. Assisted by the splendid coloured plates, which are produced from actual specimens, and the notes in the following pages, the young collector should have no difficulty in identifying the specimens he secures.

CHAPTER III

THE BRITISH BUTTERFLIES DESCRIBED

THE SWALLOW-TAIL (*Papilio Machaon*), Plate I., Fig. 1. —I find, in Scotland, where I live, that the first question put by friends looking over one's insect treasures

usually refers to this butterfly. "Is that a British butterfly?" they ask ; and on being assured that it is, they tender the information that they never saw one like it in this neighbourhood ; and it takes much explanation to make them understand how rare and local some butterflies and moths are.

Alas ! he is our one and only Swallow-Tail—the connecting link between our small island family and the great host of tropical and subtropical Swallow-Tails that flaunt their gorgeous colours under sunnier skies. And we hope he may long remain with us. The incentive to travel and capture this butterfly in his native haunts is not so great as it may have been half a century ago. For a few pence, or by exchange, the larva or chrysalis can be had from a dealer, and with ordinary care and attention it is not a difficult species to rear, and thus see alive.

That this species is already getting scarcer should be a warning to all who are interested in the preservation of our native fauna. Its extermination might not be a very difficult task ; and although it is common in many places on the Continent, its reintroduction into England would certainly be attended with great trouble and difficulty.

Two years ago (1909) an experiment was made, under very favourable conditions, to "naturalize" a colony of this fine butterfly at Easton, near Dunmow, in Essex, the property of Lord Warwick. Lord Warwick and Professor Meldola laid down a large number of chrysalids which duly hatched, and, although the sur-

rounding marsh land had been liberally stocked with the food-plant, yet no eggs or larvæ were found after the butterflies had passed their season, nor have any been seen since.

Doubtless the butterfly has many natural enemies, and when we consider the draining, burning, and rush-cutting that go on in these fen lands, it will be apparent that the time cannot be far distant when an effort will need to be made, such as at Wicken, to provide "Cities of Refuge," for many of our rare and persecuted little friends. I speak for birds, butterflies, flowers and ferns. An educated public taste would do more for them all than any amount of Acts of Parliament.

The Swallow-Tail measures fully 3 inches across the expanded wings; the prevailing tint is a pale primrose yellow, with bars and masses of black, the latter powdered with yellow scales on the fore-wings, and with pale blue on the hind-wings. There are also two red eye spots on the inner angle of the hind-wings near the tails. The under side looks not unlike a washed-out version of the upper, with a little more red on the hind-wings.

The caterpillar, too, is very beautiful, being green in colour, belted with black, and the black is studded with red spots. It thrives well on various members of the carrot family—carrot, parsley, fennel, celery; it has occasionally been found feeding on the common carrot leaves in rural gardens in neighbourhoods where the insect abounds.

The chrysalis, in which form the insect passes through the winter, is hung up in quite the orthodox manner,

belted round the back and attached at the tail. If you should find chrysalids in this position during the winter months and wish to remove them, cut away the whole support, and set them up again in your hatching cage, as you found them. Always avoid unnecessary handling of these delicate objects.

There are certainly two, and probably three, broods during a favourable summer, so this butterfly may be captured from May to August. Its headquarters are in the Fen counties of Cambridge and Norfolk, and it is found in many similar localities in fewer numbers.

Black-Veined White (*Aporia Cratægi*), Plate I., Fig. 2.—This is one of the rarest of our butterflies, though why it should be so is rather difficult to say. As it feeds upon hawthorn in the larval state the puzzle is all the greater, as a commoner or more widely distributed plant it would be hard to find. It may be also found on blackthorn, cherry, plum, apple, and pear. It is not difficult to distinguish this fine insect from all the other "Whites" on our list. The wings are rather thinly scaled; you can note this by holding the insect up to the light, and looking through the wing with an ordinary pocket-lens. Do the same with its near neighbour, the Large Garden White, and you will see a difference—the Black-Veined White is semi-transparent, while the other is quite dense.

The almost black network of veins is another unmistakable feature, as is the entire absence of a fringe to the wings. Two and a half inches is the average expanse of the extended wings.

1

5

2

6

3

4

7

1. Glauville Fritillary
2. Heath Fritillary
3. Comma
4. Small Tortoiseshell
5. Large Tortoiseshell
6. Camberwell Beauty
7. Peacock

The caterpillar is rather hairy, dull-coloured underneath, black on the back, with two lines of broad red spots running from head to tail. When you find this caterpillar, you generally get a whole brood of them, as they are gregarious and live under a web until nearly fully fed.

The chrysalis is of a bright straw colour, spotted and streaked with black, and is not so angular as the chrysalis of the Large Garden White.

The butterfly is out in midsummer, and is rarely seen outside of the most southern counties, and even there it seems to prefer the coast. In Continental gardens it sometimes attacks the fruit-trees in such numbers as to constitute a plague.

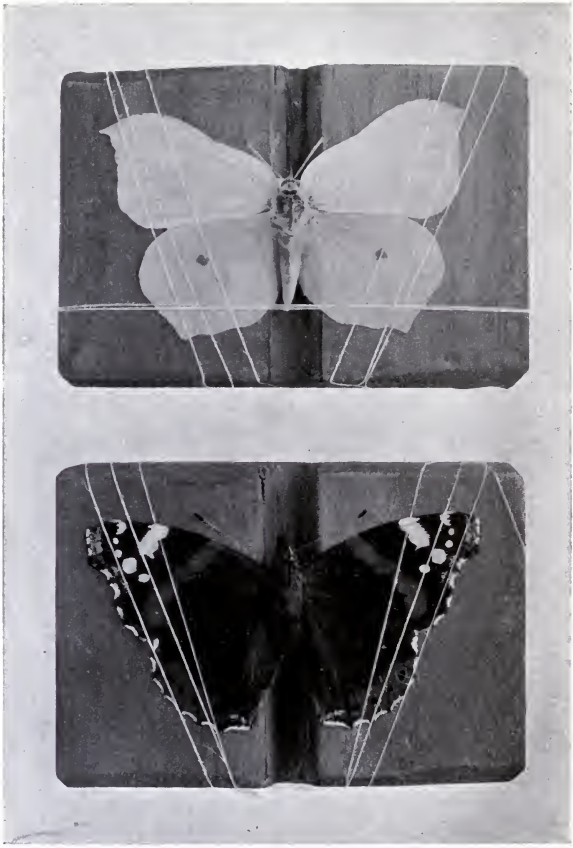
THE LARGE GARDEN WHITE BUTTERFLY (*Pieris brassicæ*), Plate I., Fig. 3, is well known to everybody. Town and country seem to be the same to him; indeed, I do believe he lives and thrives best in the town and village gardens; only twice have I met with the larva in a really wild situation, once finding a few caterpillars on a lonely shore in Arran, and I once got a chrysalis on a beech-tree trunk on the border of a large wood. Cabbage, kale, savoy, and cress, are the plants which the female usually selects as the most suitable to lay her eggs on, but as the caterpillars grow towards maturity there are few plants they will not attack, especially if they are driven by hunger and a lack of their usual food. The butterfly hardly needs description; suffice it to say that the female, besides having a rather larger expanse of black at the tip of the fore-wing, has also

two black spots and a dash (see figure) on the same wing. These are entirely wanting on the upper side of the male, but are present on the under side. The male is a little smaller than the female. Beyond question this butterfly is the most destructive of all the British species; fortunately it is largely held in check by ichneumon flies. Once I brought home a dozen or two caterpillars of this species from an isolated locality on the Mull of Kintyre, hoping to obtain some possible varieties. Not one butterfly did I hatch; they had all been stung, and mostly by a large grey dipterous fly (Plate XI., Fig. 4), although some few contained the little blackish imp which is their usual parasite. This little fellow it is who spins the small cocoons round the shrivelled skin of the victim (see Plate XI., Figs. 3, 5).

The eggs are laid singly or in small groups on the backs of leaves, and are somewhat long; they are straw-coloured, and stand up on end, so they are not difficult to find and collect, or destroy if too numerous. The caterpillar is yellow, speckled with black, and slightly spiny; it is also one of the easiest and most satisfactory to preserve. The chrysalis may be found during the winter attached to walls and fences. The butterfly is common throughout the summer.

Small Garden White (*Pieris rapæ*), Plate I., Fig. 4. —This butterfly is very like the last, but much smaller. Both species are generally found together. On the wing and in the caterpillar state they find the same nooks and corners in which to pass the winter as chrysalids.

PLATE 6



"Paisley" Method of Setting

But the caterpillars are very different in appearance. In this species the colour is a soft velvety green, with a faint yellow line down the back. Stretched at full length on the midrib of a cabbage-leaf, it is by no means a conspicuous object, and may be quite easily overlooked ; but if you see the leaves riddled with holes, and find excrement lying between them and at the base, don't cease looking until you find the culprit, sometimes deep in a cabbage, or on the back of the outer leaves.

Other caterpillars besides those of the Large and Small Whites may be present in force, notably those of the Cabbage moth (*Mamestra brassicæ*), large stout caterpillars varying from green to black ; they are far too numerous, so have no compunction about destroying all you find. The caterpillar is apt to lose its colour in preserving, as is the case with all green caterpillars.

Green-Veined White (*Pieris napi*), Plate I., Fig. 5. —Unlike the last two species, this White is more often found in the country than the town, and in my experience it is only a casual visitor to suburban gardens. I have never found the caterpillars there.

To distinguish it from the last species it is only necessary to examine the under side, where both fore- and hind-wings are strongly veined with greyish-black, the female particularly so. On the upper side the veins are distinctly marked, but the line is finer.

In a rather wet meadow where Ladies' Smock abounds in early June, I have seen this butterfly in profusion,

and not at all easy to capture when the sun was high. But when King Sol is sinking in the west, and all decent butterflies have gone to rest, a turn through the same meadow while the light still lingers reveals the Veined Whites all at rest on the flower-heads of the Ladies' Smocks. It is then quite easy to select a few of the best, and search for varieties, until in the deepening twilight butterflies and flowers became so blended as to present only a whitish blurr to the eye. There are two broods—one out in June, the other in August.

The caterpillar is green, with yellow spots on the sides, and may be found on various plants of the cruciferous order, the cress group in particular. I have found it on the Ladies' Smock (*Cardamine pratense*) and on the large-flowered Bitter Cress (*Cardamine amara*). For your collection always mount at least one of each sex with the under side uppermost. The specimen figured is a female; the male has only one round spot on each fore-wing.

Bath White (*Pieris Daplidice*), Plate I., Fig. 6.—This is the rarest of all our Whites; indeed, it is doubtful if it breeds in this country at all. A few specimens are taken annually on the south-east coast and neighbourhood, and the likelihood is that they are migrants from the Continent.

On the other hand, it is just possible that on account of its close resemblance to the Green-Veined White when on the wing, it is often passed over when mixed up with and flying amongst a number of that species.

The sexes are easily distinguished by the female having the upper side of the hind-wings broadly checkered with a double band of black spots, which is entirely wanting in the male. The under side, however, of both sexes is beautifully marbled in dark green on a creamy white ground. The caterpillar is a dull green with yellow lines on back and sides, and may be fed on cabbage or Dyer's Rocket. The chrysalis is very similar to that of the Small Garden White.

The butterfly may be met with in May and June, and again in August and September.

The Orange-Tip Butterfly (*Euchloë Cardamines*), Plate I., Fig. 7.—This is the only member of its genus inhabiting this country, though there are several others met with on the Continent. It has a wide range in Britain and may be met with from Aberdeenshire to the south coast of England, although it appears to be becoming scarcer and more local in the northern half of the kingdom. The ground colour of the upper side of the wings is white, with a large orange patch occupying almost the outer half of the fore-wing, relieved by a black tip and a black spot. In the female these black marks are larger, but the orange is entirely wanting. The under side of the fore-wing is like the upper, but the under side of the hind-wing is beautifully marbled in dark green, an effect obtained by the commingling of black scales on a yellow ground.

The caterpillar is green, with a white line on the sides, and feeds on various species of *Cardamine;* hence meadow-lands are its favourite resorts, and there the

curious sharp-looking little chrysalis may be found hung up to some dead stem during winter.

The butterfly appears in early June and does not generally survive that month.

THE WOOD WHITE BUTTERFLY (*Leucophasia sinapis*), Plate I., Fig. 8.—This is the smallest and most fragile of our white butterflies. The wings are white with a black tip on the fore-wing, and the under side of the hind-wing clouded with black scales. The body is long, slender, and a little flattened laterally. It is not a common species, and is very local where it does occur. It has been found as far north as the Lake District, and down to the south coast. It is unrecorded for Scotland, but has been taken in Ireland.

The caterpillar is green, with yellow lines on the sides; it feeds on various members of the pea family—Vetch, Trefoil, etc. It appears on the wing in May, and sometimes a second brood occurs in August; so you may look for the caterpillar in June and again in September.

THE PALE CLOUDED YELLOW BUTTERFLY (*Colias Hyale*), Plate I., Fig. 9.—I think there can be little doubt that this fine butterfly is on the increase with us; from all over the southern counties come records of its comparative plenty. In the *Entomologist* (October, 1911) I read of over one hundred being seen or captured by various collectors. Norfolk, Suffolk, Essex, Kent, Bucks, are amongst the favoured places, and Lucerne- or Clover-fields are the attractions.

The question of the migration of this and the follow-

Apparatus for Preserving Larvæ

ing species is still very far from being satisfactorily settled. That we do get a swarm over from the Continent when conditions are favourable is a matter of common knowledge, but whether we have resident and permanent colonies of our own is still doubtful. In any case this year (1911) has been a *Hyale* year, and we give thanks. The ground colour of this butterfly is a pale primrose-yellow. There is a broad black border beginning at the tip of the fore-wing and continuing on to the hind-wing, where it gradually dies out at the bottom angle ; placed on this band of black are a few yellow spots. There is also a black spot on the fore-wing, and a faint orange spot near the middle of the hind-wing. The under side is more of a yellow shade, and a line of brown spots runs round the outer margin of both wings. There is a silvery spot in the centre of the hind-wings, like a figure 8 bordered with pinkish brown, and in fine fresh specimens the fringe is of the latter colour. The female is a shade lighter in ground colour and also shows more black.

The caterpillar may be looked for in June and July on Clover and Lucerne ; it is green, with yellow lines running along the back and sides. The chrysalis is green with a single yellow line.

The latter half of August and the first half of September cover the best period of its flight in this country ; on the Continent there is a spring brood.

The Clouded Yellow (*Colias Edusa*), Plate IV., Fig. 1.—As with the last species, we have still much to learn of the habits of this fine butterfly. Some years

it is plentiful, while in others hardly a specimen will be seen—and as for the caterpillars, we never hear of them being successfully searched for. The probability is that from a few spring visitors from the Continent we get a number of descendants in August, when a great many more arrive from across the Channel and mingle with them. The distribution of nearly all animals is regulated by the food-supply, the climate, or their enemies; yet none of these seem to satisfactorily account for the disappearance and reappearance of *Edusa* with us. It is a strong flying insect with a roving disposition, and on quite a few occasions it has been noted as far north as Arran and the Ayrshire coast, in Scotland. The brilliant orange and black wings make its identity unmistakable. Not so, however, with the light sulphur-coloured female variety, which very nearly approaches the typical female form of *Hyale*, but it may be distinguished by the broader black band on both fore- and hind-wings, and a heavy sprinkling of black scales near the base of the former, and all over the latter. The orange spot, too, in the centre of the hind-wing is deeper, and, being on a darker ground, looks much brighter. There is no corresponding male variation.

The caterpillar is dark green, with a light line on each side, varied with yellow and orange touches. It feeds on various plants of the pea order—vetches, trefoils, clovers, etc. The chrysalis is brown spotted, and is striped with a yellow line. The butterfly appears with us during August and September.

PLATE 8.

1. Red Admiral
2. Painted Lady
3. Milk Weed
4. White Admiral
5. Purple Emperor (Male)

The Brimstone

The Brimstone Butterfly (*Gonepteryx rhamni*), Plate IV., Fig. 2.—When I glance at this beautiful butterfly, I always feel inclined to laugh, not *at* the butterfly—oh dear no !—but at a practical joke I once saw through, much to the astonishment of a soldier friend. He had brought home a large assortment of fine butterflies from India, and in going over the stock my attention was arrested by the peculiar pattern on one of them. For ground colour and outline it certainly resembled our own Brimstone, but what weird markings ! Turning the hand-glass on it revealed the fact that it was *hand-painted.* I asked the sergeant who did this, and then he suddenly remembered, and gave vent to a loud guffaw. "The scamps, by Jove ! That carries me back to a certain mess-room at Darjeeling when this insect was handed over to me by a certain young officer as a great rarity. He was sure there was not another like it in the camp ; and he was right. Lots of our fellows went 'butterfly dodging,' and had big collections to take home ; but not one of them had this one. They named it 'The Officer's Fancy.' Now, I recollect seeing this same officer out sketching and fooling around with a box of paints. It's clever, though, isn't it ? He took us all completely in." This was hardly to be wondered at ! The colours had been very delicately laid on, and the pattern adopted was of the eye-spot and streak order, so that the whole effect was quite harmonious and in good taste.

But the Brimstone requires no artificial aids to make it a warm favourite with all butterfly lovers ; if it lacks

variety of colouring, it more than makes up for it in the beautiful sweeping outlines of the wings. No other butterfly on our list can show such sweet harmony of line and contour. Like a breeze-blown daffodil, he greets us on our early spring rambles, just when the opening blossoms and leafy buds are all doubly welcome, in that we have missed their friendly presence through the long days of winter. The female hibernates in all sorts of out-of-the-way corners—in dense holly-bushes, piles of brushwood, chinks of walls, etc., coming forth again in May or even earlier to deposit her eggs on the Buckthorn and its allies. The antennæ are rather short and more like a club than a drum-stick, while the beautiful white silken mane along the back is quite a noticeable feature. The female is of a much lighter tint than the male.

The caterpillar is green, with paler sides, along which runs a white line : it may be found on the Buckthorn from May till July. The chrysalis, which is supported on the tail and band principle, is green and yellow, and rather oddly shaped. It hatches in the course of about three weeks. This butterfly is a plentiful insect south of the Border, but we have yet to record it for Scotland.

The Small Pearl-Bordered Fritillary (*Argynnis Selene*), Plate IV., Fig. 7.—Like all the members of its family the ground colour of the wings of this insect is a reddish-brown, marbled and spotted with black. For size it differs little from the next species, and the upper surface of the two being so much alike, it is sometimes difficult to distinguish between them. The under side

(Plate X., Fig. 3), especially of the hind-wings, however, renders the task of identification comparatively easy: the ground colour is a deeper brown in this species and causes the pearl border to stand out in stronger relief; besides, numerous other pearl spots brighten its surface. It is a local butterfly, with a wide range of distribution both in England and Scotland; and where it does occur it is generally common. In the South it may be double brooded, but in the North the June flight is all we see of it for the year.

The caterpillar is black, with an interrupted white line along the back; the spines are brown; it feeds on the dog violet (*Viola canina*). The chrysalis is ash-coloured.

The Pearl-Bordered Fritillary (*Argynnis Euphrosyne*), Plate IV., Fig. 8.—Perhaps this is the commoner of these twin butterflies, though its range of distribution is much the same as the foregoing. In its case, also, the under side of the *hind*-wings furnishes us with the main points of distinction. Here the markings are a warm mid-red shade on an ochreous ground; the pearl border is very pronounced, and in the middle of the wing a single pearl reposes. Nearer the body there is another smaller spot hardly so bright. If you set several of these two species with the under side uppermost, you will soon get quite familiar with the difference between them. Plate X., Figs. 3, 5, shows this distinction.

The caterpillar is similar to the last species and prefers *Viola* as a food-plant, but I have found it in

little colonies where it most certainly must have fed on other plants, as *Violas* of any species were distinctly rare in the district, which is wet and marshy. For Scotland there is a single brood in June, while in the South it is double-brooded—May and August.

THE QUEEN OF SPAIN FRITILLARY (*Argynnis Lathonia*), Plate IV., Fig. 6.—This is, unfortunately, the rarest of all our Fritillaries; unfortunately, because it is the most beautiful and brilliant. In outline the fore-wing differs from that of the two preceding species, being slightly concave on the outer margin, while the hind-wing bears a slight trace of scalloping. But it is on the under side where all the treasures lie. A row of seven pearl spots adorns the outer margin of the hind-wing; then comes a row of small dark spots, each with a pearl-spot in its centre; then a profusion of large and small glittering patches completes this beautiful wing. The under side of the fore-wing has only three (or sometimes a tiny fourth) pearl spots near the tip. This butterfly is taken occasionally in clover-fields in our south-eastern counties. The specimens taken there are possibly migrants from the Continent.

The caterpillar is dark, with a white line on the back, yellow lines on the sides, and is clothed with short red spines. It may be found on *Violas*. As this insect is double-brooded on the Continent, it is well to look out for it during the whole summer from May to September.

THE DARK GREEN FRITILLARY (*Argynnis Aglaia*), Plate IV., Fig. 4.—The only claim this handsome species has to be called green lies in the fact that the under side

of the hind-wing has for its ground colour a delightful tawny green. But the main attraction is the lovely rows of pearl spots ornamenting the under side (Plate X., Fig. 1); and there are four of these rows. One, and it is perhaps the finest, runs round near the outer margin, and consists of nine gems; the next, a little nearer the body, has eight, and is slightly irregular; the next row has only three, rather widely apart; and the fourth, and last, has also three very small ones quite near the base of the wing. The under sides of the fore-wings have also their pearl spots. Near the outer margin you will find a row with eight of them, beginning boldly near the tip; they gradually fade until the last of the row is barely visible. On some male specimens there are two silvery spots also near the tip, but on other specimens these are absent. The under side of the fore-wing has very little green to show; the tip of the wing is just tinted, and this tint is carried along the costal margin. I have described the under side in some detail, as I have seen it described as having only three rows of spots on the hind-wing, and no pearl spots at all on the fore-wing; and for another reason, I want you always to confirm your captures by a good text-book, as by so doing you will learn some valuable lessons in comparison and observation, and in noting details; and also it will enable you, perhaps, to add some fine variations to your collection.

The caterpillar lives on various species of wild *Viola*, and may be found on them in the early summer, but as the butterfly has a wide range of distribution, season

and locality make it vary a good deal in the time of its appearance. It has been found from the North of Scotland to the South of England. July is the month to look for it. I always find it more abundant near the coast. It is a bold flying species, and often difficult to capture ; but in good settled weather I have taken it frequently at rest on thistle-tops *at sundown*.

The High Brown Fritillary (*Argynnis Adippe*), Plate IV., Fig. 5.—In this and the foregoing we have again two species very easy to confound, and all the more so when we note that stable characters are somewhat hard to find on the upper surface of the wings—in general the ground colour in *Adippe* is richer and darker, and the outer margin of the fore-wing is not so rounded as in *Aglaia*, being either straight or very slightly concave. The arrangement of the second row of spots, which runs round near the outer margin of both wings, is different in the two species, but they are very inconstant and even vary in the sexes ; so the *under side* must be again consulted (Plate X., Fig. 2). And here we have an unfailing test. In *Adippe*, on the under side of the hind-wing near the outer margin, there is a row of dark red spots lined internally with black, and in the centre there is a small pearl spot. These eyelike spots are never present in *Aglaia*. The general green tint, too, of *Aglaia* is absent in *Adippe*. The silvery spots on the under side of the fore-wing of *Aglaia* are rarely to be seen in this species. In some females of *Adippe* three shadowy spots are visible near the tip. I have never seen these on a male ; so we have it that, in the

great majority of specimens of *Adippe*, the under side of the fore-wing is devoid of silvery spots. While *Adippe* may be fairly common in the South, it is by no means so widely distributed, nor does it range so far north as *Aglaia*. In Scotland it is unknown.

The caterpillar is dark grey, with a whitish line along the back, and is covered with rust-red spines. It feeds on *Viola*. The butterfly appears in July.

The Silver-Washed Fritillary (*Argynnis Paphia*), Plate IV., Fig. 3.—This is the largest of our native Fritillaries, and is easily distinguished from the others by an entire absence of the silvery spots so characteristic of this genus. The upper surface of the male is of a warm, orange-brown, streaked and dotted with black on both wings; the under side of the fore-wing is much lighter, the spots on it are smaller, and the tip is marked with olive; the hind-wing under side bears a fine combination of pale olive with faint lavender and silver streaks, while its outer margin is distinctly scalloped. The female is quite different. In it the ground colour of the upper side of the fore-wings is much paler, and the black streaks along the veins are absent. The hind-wings have the same pale tint, but with a more decided tinge of olive, while the under sides of both wings, and especially of the hind ones, are pale olive green, and the scalloping round the outer margin of both wings is more pronounced. In the female variety *Valesina*, the upper surface has a dark olive ground shading out towards the tip of the fore-wings. This, with the black spots lying on it, gives the butterfly

quite a black appearance at a little distance. This variation is mostly found in the New Forest. The butterfly is common in many districts of England, but is rare in Scotland.

The caterpillar is covered with long spines, nearly black, and has a pale line along the back and sides; it feeds on Dog Violet and Wild Raspberry. The chrysalis is rather stout, hangs by the tail, and is greyish, with shining points. The perfect insect is out in July and August.

THE GREASY FRITILLARY (*Melitæa aurinia*), Plate IV., Fig. 9.—This may not seem a pretty or poetical name for a butterfly. Beauty, poetry, and the "fitness of things," might have suggested a more appropriate title; but, as Dickens has said, "the wisdom of our ancestors is not to be disturbed by unhallowed hands," and as the technical name is in this instance some compensation, we may have to let it go at that. "Greasy" the butterfly is not, but only *looks* as if it were, when slightly worn; and, owing to some peculiarity in the arrangement of its scales, this slight wearing is very soon accomplished. Happily it is not a difficult insect to rear, and fine specimens without a suspicion of greasiness in their appearance can thus be had for the cabinet. This butterfly is quite distinct from any other British Fritillary, inasmuch as it has two very distinct ground colours on the upper side of its wings, a rich orange-brown and a pale ochreous yellow. The bands of this latter shade are bordered with dark brown; a reference to the coloured figure will show how these

1. Marbled White
2. Mountain Ringlet
3. Scotch Argus
4. Speckled Wood
5. Wall Brown
6. Grayling (Male)
7. Meadow Brown (Female)
8. Small Meadow Brown
9. Ringlet
10. Marsh Ringlet

colours are disposed. It is a rather variable species, and is widely distributed. It is found in glens and damp meadows and is generally abundant where found, though local.

The caterpillar is black, with a greyish line along the sides, and a small white dot above this between each segment. The chrysalis is ashen, with red and black spots; it is rather "dumpy," and may be found on various low plants early in the summer, and again, in some southern localities, in the autumn. Like nearly all the Fritillaries the larvæ hibernate while very small, so it is best to leave them in their natural state until fairly well fed. Narrow-leaved Plantain, Scabious, and, some observers say, Foxglove and Speedwell, are its favourite foods. The times of flight are May and August. In many Scotch localities, Argyllshire, Ayrshire, etc., this species is abundant.

The Glanville Fritillary (*Melitæa Cinxia*), Plate V., Fig. 1.—This little butterfly is one of the "threatened species." If due care and discretion be not exercised, there is a possibility of its becoming extinct in this country. "Threatened people live long," but it were wise not to push our little friend too far; and wiser still if collectors who live in or near its favourite haunts would not only try to preserve it, but also make some attempt to spread its range into other localities apparently suitable for its propagation. We have far too few native butterflies to run the risk of losing any we have. And as the food-plant is the Ribbed or Narrow-leaved Plantain, it follows that even were this

species as abundant as its food would warrant, it could not possibly do any harm to anyone, either gardener or farmer. The ground colour might be called Fritillary brown, relieved with the usual black bands and spots; the hind-wings show a distinct row of black spots on a light ground running round near the outer margin. But the under side (Plate X., Fig. 4) is more striking and unmistakable, especially that of the hind-wing. The fringe itself is dotted at intervals with black; then follows a line of crescent spots on a cream-coloured ground; a fulvous band scalloped with a black outline traverses the wing, and on this band are dark spots edged with red. Then there is a cream band with black spots, and a broken-up band of fulvous spots edged with black. There is cream again next the body, with a few more black spots. The under side of the upper wing is a light orange-brown, and cream towards the tip, and bears a few black spots.

The caterpillar is black, with dark red between the segments; head and pro-legs red; spines short, crowded, black. The chrysalis is stout, yellowish-grey, dotted with black, and is sometimes enclosed in a loose web. The chrysalids I have reared always adopted this mode of concealment and protection. I have also been much impressed with the strong resemblance of the caterpillar to the flower-heads of the Narrow-leaved Plantain, amongst which it lives. The Isle of Wight appears to be the headquarters of the species, and it is found in a few other localities on the mainland. It appears in May and June.

PLATE 10

1. Dark Green Fritillary (under side)
2. High Brown Fritillary (under side)
3. Small Pearl Bordered Fritillary (under side)
4. Glanville Fritillary (under side)
5. Pearl Bordered Fritillary (under side)
6. Heath Fritillary (under side)

The Heath Fritillary (*Melitæa Athalia*), Plate V., Fig. 2.—There is more black, or dark brown, on the upper surface of this species, hence the insect looks darker in general aspect than any of the foregoing Fritillaries. The under side, too (Plate X., Fig. 6), is marked very like *Cinxia*, but the light bands on the hind-wings are more of a yellow tint, and the line of black spots through the central band are wanting; the veins are also more prominent and black. Altogether it is not difficult, on comparing the two under sides, to at once distinguish them.

It is also a rather local species, being confined to the South of England and Ireland. Both caterpillar and chrysalis are very like those of the last species; the spines, however, are rust-coloured. It feeds on Plantain. The perfect insect is out from May to July.

The Comma Butterfly (*Vanessa c-Album*), Plate V., Fig. 3.—The tatterdemalion of the family, it looks, indeed, as if some hungry caterpillars had been dining on its wings, and had been scared away in the middle of the feast, leaving all sorts of rags and tatters to attest their visit. The costal margin is the only line left entire; all the others are deeply scalloped and indented. Two tails form the longest projections from the middle of the outer edge of the hind-wings. The ground colour is a uniform rusty red, varied with black spots arranged in the same order as in other species of this genus. There is a dark border round the outer margin of both wings. The under side is strikingly different from the upper, and looks extra-

ordinarily like a dry, withered leaf, the more so on account of its ragged outline. In the middle of the hind-wing is a very clear comma-shaped mark; from this the insect takes its name.

The caterpillar is yellowish on the back for the first five segments, then white to the tail; under side brown. The spines are shorter than in others of this group. It feeds on Hop, Elm, Gooseberry, Nettle, Willow, and Sloe. The chrysalis is brown, with gilt points. The butterfly appears in July and is rather local, being found mostly in the Midlands and Wales. It has been recorded for Scotland, but not of late years.

The Large Tortoiseshell Butterfly (*Vanessa Polychloros*), Plate V., Fig. 5.—The ground colour of this handsome species is a tawny yellow, marked with three large black patches along the costa of the fore-wing; between these patches the colour is somewhat lighter. There are four other black spots occupying the centre of the wing, which also has a black border dotted with brown; hind-wing tawny, with one black patch on the upper margin, but not extending inward to the body as a similar spot does in the next species (*Urticæ*). The dark border is continued along this wing, and is studded with blue spots edged with a paler line. This species might be confused by the novice with the next, but not if the two were together for comparison; then the points in which they differ are seen to be distinct and permanent. In *Urticæ* the light ground between the costal blotches is yellow and the outer spot blue-white; there are only *three* black spots

in the centre of the wing, the largest one being continued *down to the margin*, which is not the case with the corresponding spot in *Polychloros*. On the hind-wing the black patch continues downward towards the bottom angle and inwards to the body, whereas this spot neither goes in nor down in *Polychloros*. Lastly, the ground colour in *Urticæ* is or a bright red, almost a scarlet, with the blue spots extending into *both* wings.

The caterpillar of *Polychloros* is brown, spiny, and striped along the back and sides; it feeds on Elm, Willow, and Cherry, during the summer months. The butterfly appears in August.

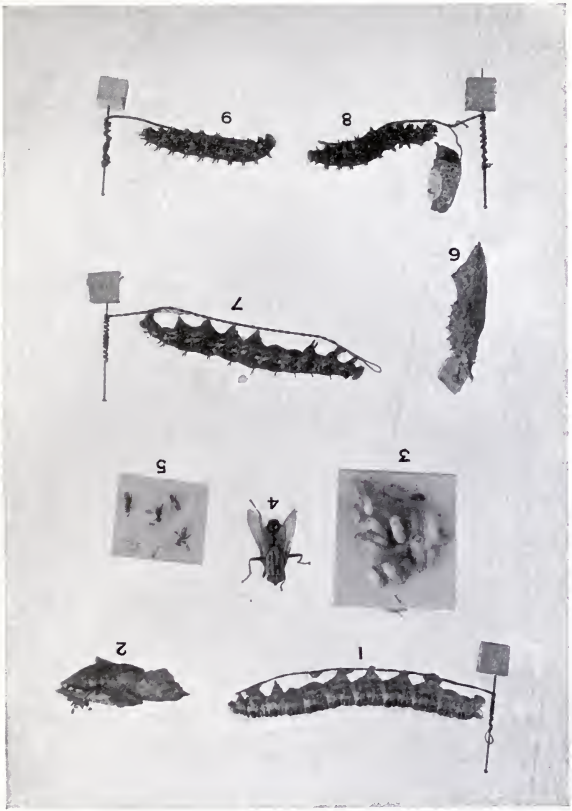
It is by no means so common with us as its smaller and gayer cousin, being confined mostly to the South of England. There are occasional records for Scotland; I was present when a specimen was captured by a friend on the coast of Argyllshire in the year 1887.

The Small Tortoiseshell Butterfly (*Vanessa Urticæ*), Plate V., Fig. 4.—Among the many puzzling problems that naturalists have to solve, few present greater attractions than those relating to the migration and hibernation of animals. The birds have long claimed the attention of ornithologists in this respect, but the insects have in a great measure been neglected. However, there are signs of a revival. Migratory and hibernating butterflies are well enough represented in the British list to supply material for much patient and useful research. The facts about them are not all known—not by any means. We know, or fancy we do, that the dominating factor in both cases is the food-

supply, but that there are other and important elements to be considered is beyond dispute. The Small Tortoiseshell is a hibernating species, but why does it not deposit its eggs in the autumn, and go the way of all flesh and butterflies? Could it not evolve a method of securing its eggs so that the young caterpillars might have a fair chance of survival when ushered into the world? Or has it found it easier and safer to take care of these eggs itself during the long winter months, and then, when returning spring once more brings the Nettle-shoots above ground, launch forth upon the wing once more, to seek and to find a home and a larder for its numerous children to be? What would be the fate of these eggs if laid in the autumn? Who can tell? Various enemies and agencies would be constantly at work seeking to destroy them. The Nettles have all died down and left hardly a trace behind. And what the rain and wind had not scattered far and wide, the ants and beetles would account for.

The Small Tortoiseshell is perhaps the best known of all our coloured butterflies, occurring, as it does, all over the country from Land's End to John o' Groats. It is very like the last species, though smaller and brighter; but as I pointed out the various distinguishing marks in describing *Polychloros*, I need not go into them again.

The caterpillars feed in companies when young, spreading themselves over the Nettles as they grow older. They are black on the back with a checkered double line along the sides; across each segment is a row of branched spines with numerous small simple



1. Larva of Large Garden White
2. Pupa of Large Garden White
3. Ichneumon Cocoons [White
4. Dipterous Parasite of Large G.
5. Ichneumon Flies hatched from 3
6. Pupa of Small Tortoiseshell
7. Larva of Small Tortoiseshell
8. Larva and Pupa of Glanville Fritillary
9. Larva of Greasy Fritillary

hairs between. The chrysalis hangs by the tail; it is grey-brown, with gilt points. The eggs are laid in May, and the butterfly appears towards the end of June, and continues more or less abundant until October, when the females retire to some safe corner in old walls or outhouses, there to await the passing of the winter.

The Peacock Butterfly (*Vanessa Io*), Plate V., Fig. 7.—This beautiful species is too well known, and too distinct in its colour and pattern to require any written description.

Few butterflies possess a name which so aptly describes them, and to make a mistake in its identification is hardly possible. All its efforts seem to have been expended on the ornamentation of the upper surface, for the under side has hardly an attractive note. Dark and sombre though it be, it is well adapted for concealment during its period of hibernation.

The caterpillar is black, with bands of white dots round each segment, and the spines are larger than in the Small Tortoiseshell. It feeds in batches on Nettles, from June to August. The chrysalis inclines to green and has burnished spots. This species is common in England, and is occasionally met with in the South and West of Scotland.

The Camberwell Beauty (*Vanessa Antiopa*), Plate V., Fig. 6.—Why does not this handsome butterfly settle down amongst us, increase and multiply, and thus swell the little band of real natives who gladden the eye of the entomologist on his country rambles? It is a common insect over most of the Continent, and

most abundant in North America, well up into Canada, where the winter is extremely severe. We have the food-plant in abundance, yet it is questionable if ever the Camberwell Beauty has been found in any but the winged state in this country. Records there are of its capture year after year, but there never seems to be progeny left by these occasional visitors. The wings are a dark chocolate-brown, bordered with creamy white. Between the brown and the white is a broad black band studded with blue spots ; there are also two white spots on the costal margin near the tip of the fore-wing. It measures from $2\frac{1}{2}$ to $3\frac{1}{2}$ inches in expanse, North American specimens being the largest.

The caterpillar is black, with white dots, and has a row of red spots along the back. The pro-legs are also red, spines black. It feeds on the Willow. The chrysalis is brown, with darker spots ; its abdominal points are sharp and angular. Single specimens of this species occur in most seasons from August to October, generally in the South, but it has been recorded for Scotland on several occasions.

The Red Admiral (*Vanessa Atalanta*), Plate VIII., Fig. 1.—He must have been a poet who first conceived so appropriate a name for this gallant rover. Possibly he was living long ago—

> "When Britons truly ruled the waves,
> In good Queen Bess's glorious days,"

or later, when Nelson's old "wooden walls" spread their bellying sails to catch the breeze. Those were days of romance. Fancy the Admiral of a super-

PLATE 12.

1. Small Heath
2. Green Hairstreak
3. Purple Hairstreak (Female)
4. White-letter Hairstreak
5. Black Hairstreak
6. Brown Hairstreak (Female)
7. Large Copper (Male)
8. Small Copper
9. Long-tailed Blue
10. Silver-studded Blue (Male)
11. Brown Argus
12. Common Blue (Male)

Dreadnought—that big, black abortion of coal and iron —being associated with a butterfly! We would rather peer into the future and elect our aerial commander the "Red Admiral" of a fleet of graceful aeroplanes. This would certainly be more appropriate.

The colours of this butterfly on the upper surface are singularly bold, striking, and, withal, simple. They furnish a good test of colour discrimination. I have heard them spoken of as "jet black," "intense black," or "velvety black." If you take a specimen into a good light, you will see that the whole area enclosed by the scarlet bands is a deep coffee-brown, while outside the band, on the fore-wing, the colour is black splashed with white, and there is a blue streak near the outer margin. The under side is a marvel of beauty too complex and wonderful for cold print. Common though this insect is all over our island from August to chill October, who can say that he has discovered his "retreat and hiding-place" from the storms and frosts of winter? Indeed, there are those who boldly assert that the Red Admiral *does not* hibernate with us at all, and, consequently, we are indebted each year for our supply to spring visitors from the Continent, which may be the reason why in some years it is more abundant than in others.

The caterpillar is a powdery yellow-grey in colour, sometimes inclining almost to black; a line of white spots appears on each side; there are some darker markings along the back, and a row of branched spines light in colour crosses the middle of each segment. You

will generally find it hiding within a curled Nettle-leaf during the day. The chrysalis is grey, with a few shining points.

The Painted Lady (*Vanessa cardui*), Plate VIII., Fig. 2, is quite a suitable companion for a "Red Admiral," and they are often seen in company, although *cardui* is the earlier on the wing by at least a fortnight, and often a month. The ground colour of the upper surface is a rosy orange, varied with black and brown markings, while the white spots near the tip of the fore-wing are almost similar to those of the Red Admiral. Here, too, the under side is an exquisite bit of painting. It reminds one of a frosted window done in harmonious secondary colours. No doubt this subtle pattern must be protective, for you will notice that when the insect is at rest with the wings shut, the bright portion of the under side of the fore-wing is concealed. This is decidedly a migratory species, and it is an open question whether it hibernates in Britain. In Scotland we never see it until the autumn, and occasionally it arrives in fair numbers. We had one extraordinary swarm about the year 1880; I remember being on holiday at the time on the Island of Cumbrae, in the Firth of Clyde. *Cardui* was everywhere, and even fighting for possession of the Thistle-tops. In 1911 I had to be content with the sight of two specimens in Arran, but I heard of several more.

Like the other *Vanessa* caterpillars, the larva of this species is thorny, brown, and bears lines and spots of yellow. It may be found on Thistles and

Nettles in May and June. The chrysalis is like that of *Atalanta* in colour, but hardly so stout.

The White Admiral (*Limenitis Sibylla*), Plate VIII., Fig. 4.—This butterfly is almost black on the upper surface, relieved by white bars and spots, and there is a row of dense black spots near the outer margin of the hind-wings. These white marks are carried through the wings to the under side, but the ground there is formed of various shades of brown, with some black dots and pencillings—while on the under surface of the body, and spreading out from it on to the wings, is a considerable region of a light sky-blue tint, very pleasing to the eye.

The caterpillar feeds on Honeysuckle, and is a lively green ; the spines are reddish, those on the third, fourth, and sixth segments being larger than the others. There is also a white line bordered with brown along each side. The head is also red, with two lines of white down the face. The chrysalis is dark green, with silvery dots and lines, and bears grotesquely swollen lumps. This is a butterfly that I am afraid is becoming scarcer year by year ; it is confined to the South. It is out in July.

The Purple Emperor (*Apatura Iris*), Plate VIII., Fig. 5, is undoubtedly the king of the forest glade. Wearing the regal purple, he looks down upon the world from his lofty throne on the top of some lordly oak. Somehow the build of this fine insect when seen in the hand cannot fail to impress the beholder with a sense of muscular power. The thorax is long, broad,

and deep—more so than in any other British butterfly—and the abdomen, head, and antennæ are in like proportion. The wings are ample and in shape smart and serviceable. No loose scales or fluffy hairs soften the firm compactness of his whole bearing. Dark brown and purple alternate with the changing light all over the upper surface; a dash or two of red, and one eye-spot on the bottom angle of the hind-wing, with a bar and a few spots of white, are the main additions to the changing hues of the purple. The under side has a daring lightning flash of blue-white on a brown and olive ground on the hind-wing. The fore-wing (under side) has various spots of black and white on a darker ground, while there is also one eye-spot near the outer angle. He is said to have a fondness for carrion, and this queer taste is sometimes his undoing, as he is more readily captured when indulging his appetite than when soaring round the crown of some lofty oak.

But it is better still to seek for the caterpillars. These may be found on low Sallows or Poplars. They are green, dusted with white, and have oblique dashes of yellow on the sides; they taper considerably towards the tail, while the head is adorned with a pair of horns. The chrysalis is similarly coloured while alive, but when its inhabitant is gone the colour vanishes with it, and all that remains looks like a little bit of crumpled tissue paper. It may be found suspended to the under side of a leaf of the food-plant. The butterfly is out in July in the southern counties, and is oftener seen than captured.

Marbled White

The Marbled White Butterfly (*Melanargia Galathea*), Plate IX., Fig. 1.—We now come to a group of butterflies (the *Satyridæ*) quite the reverse in build and habits from the Emperors and Admirals. Of medium or small size, though the wings are ample, the body is small and the muscular power is never great; hence they are soft and downy, never fly far at a stretch, and are, although many of them common, very local in their habits.

And the Marbled White is no exception to the group. His name may suggest something hard, polished, and durable, yet he is anything but that. I wonder what his name might have been had he been common north of the Tweed, and not known in the South? To Sir Walter Scott, James Hogg (the Ettrick Shepherd), or Professor Blackie, the similarity of the black and white wings to the checking and soft, embracing folds of their own beloved tartan plaids would at once have appealed to their imagination, and henceforth they would have alluded to him as the "Shepherd's Plaid" butterfly.

Creamy-white, with grey and black checking, and a few eye-spots on the black band of the hind-wings complete his simple scheme of colour. The under side is somewhat similar to the upper. Although common enough where it is found, it is a very local and stay-at-home butterfly.

The caterpillar is a grass-feeder, and is green, with a red head and tail. It tapers considerably towards both extremities. They are very small when they hibernate. The butterfly is out in July and August.

The Mountain Ringlet Butterfly (*Erebia Epiphron*), Plate IX., Fig 2.—It is strange that this fragile little fellow should choose the rough mountain-side for his home. In a boggy hollow of Ben Lomond, nearly 2,000 feet above the sea, buried in snow almost the whole winter through, I know a colony of this butterfly which lives and flourishes under these seemingly impossible conditions. Doubtless it could be found on many more of our Highland hills.

The wings are a dark, fulvous brown, with an inconstant red bar near the outer edge of both wings, and on this rusty bar are usually a few small eye-spots, sometimes absent, or reduced to mere specks. The under side is almost similar. It is a very easily damaged little creature, requiring great care in handling, and I may add that in catching it is always advisable to carefully select your specimens *on the ground*, as quite a large percentage always appear to be rubbed, so soon do they become unfit for the cabinet even in the height of their season, which occurs during the first fortnight of July.

The caterpillar is said to be green, and feeds upon various grasses. It is also found on the mountains of Cumberland and Westmorland.

The Scotch Argus Butterfly (*Erebia Æthiops*), Plate IX., Fig. 3.—Like all butterflies, the Scotch Argus is seen at its best in its native haunts. You feel it has a subtle kind of association with its surroundings that defies definition. Seeing this species flirting about in dozens in a dell where the air is heavily

laden with the perfume of Bog-myrtle and Honeysuckle, and where dragon-flies, bees, hover-flies, wasps, and ants, raise a drowsy hum dear to the ear of the entomologist, not to mention the hordes of bloodthirsty little midges, tends to the formation of a mental impression, which we always associate with this beautiful butterfly. It takes strange notions, too, at times. I have found it often "at home" as described above, and, again, I have come upon it solitary and alone on the bare hillside, far from the madding colony amongst which it was born. Five such wanderers I once encountered in a single day in August. All were on the move, either seeking a lost home or lover, or possibly pastures new.

The breeding ground is generally some sheltered glade or open corner of a wood. The butterfly is coloured a beautiful dark, velvety brown, with a broad, irregular tawny red band near the outer margin of both fore- and hind-wings. Within this band on the fore-wings are three black spots, each having a tiny white spot in its centre, and the hind-wings have in most cases a similar adornment; but as these spots are subject to great variation, always aim at securing a good row for your cabinet in order to show as many variations as you can find.

The under sides of the sexes differ from each other and are distinctive. In the female the under side of the fore-wing is marked very much the same as the upper side, but the whole colour scheme is lighter, while the hind-wings are a lighter brown, with a pale lavender band, distinctly iridescent and with just a

trace of spots. The male, though nearly the same in markings, is very much darker.

The caterpillar is a grass-feeder, and is green, with some lighter and darker stripes. It is very like the grass it lives amongst. The eggs are laid in the autumn, and the young caterpillars hibernate.

The Speckled Wood Butterfly (*Pararge Ægeria*), Plate IX., Fig. 4.—There must be something peculiar about this butterfly, which always reminds me of a snake; it is curious how such an idea gets into one's head and sticks there. I have a lot of preserved home and foreign snakes, and not a few of them are checkered and marked like this butterfly's wings; one large skin of a boa constrictor bears a remarkable resemblance both in colour and spots. Nature seems to delight in these eyelike markings—you will find them on the trout, the peacock, the leopard, and on certain beetles, flowers, and birds' eggs. Wherever you find them they are always beautiful and interesting, and have a certain protective use.

The Speckled Wood is more easily recognized than described. The upper side is of a dull brown, spotted with pale yellow, or (as in some northern specimens I have taken) with white. There is one eye-spot near the tip of the fore-wing, and a row of three, sometimes four, similar spots in a submarginal row on the hind wings. The under side is richer and warmer in colour, having a purple tinge, while the eye-spots of the hind-wings are nearly obsolete, but the spot on the fore-wing is, if anything, brighter. It is a fairly common species,

1. Adonis Blue (Male)
2. Chalk-hill Blue (Male)
3. Little Blue
4. Azure Blue
5. Large Blue
6. Duke of Burgundy Fritillary
7. Grizzled Skipper
8. Dingy Skipper
9. Small Skipper
10. Lulworth Skipper
11. Large Skipper (Female)
12. Pearl Skipper (Male)
13. Checkered Skipper

and loves quiet, shady lanes on the edge of woodlands. In the South it is double-brooded. The female is larger and brighter than the male. The caterpillar is a grass-feeder, and is green, with lighter stripes. The butterfly is out from May to August.

The Wall Brown Butterfly (*Pararge megæra*), Plate IX., Fig. 5.—A rather smaller butterfly than the last, with the same number and arrangement of the eye-spots. The ground colour is, however, a light tawny brown, with dark brown markings. There is a broad diagonal bar across the fore-wings of the male. All the wings are bordered with brown. The female has two zigzag lines in place of the bar, and consequently has a lighter appearance; she is usually a bit larger than her mate. The under side of the hind-wings is a beautiful study in greys and browns, with the dainty little eye-spots double ringed. This species is common on waste lands and roadsides throughout the country; it is local in Scotland, but abundant where found, especially in Ayrshire. There are two broods only in the South.

The caterpillar is light green, with lines on the back and sides, and may be swept from grasses with the net in midsummer. The chrysalis is short and stout, and is found suspended by the tail to a strong grass stem.

The butterfly loves to rest on walls and stones which have been warmed by the sun; hence the name the "Wall-Brown."

The Grayling Butterfly (*Satyrus Semele*), Plate IX., Fig. 6.—This fine butterfly is larger and

bolder in flight than any other of this group in our country. But you must always remember that butterflies love the sunshine, and without its cheering presence they are all very dull fellows indeed. Hence it is that a butterfly may appear, and really is, difficult to catch on a bright, warm day; yet it may fall an easy victim, and give but indifferent sport on a dull one. The Grayling has a strong partiality for living near the sea, and is found all along the west coast of Scotland, whether it be on a rock-bound shore or in a sandy, sheltered bay. During July and August one is pretty sure to encounter the Grayling sporting along just above high-water mark, and, not infrequently, whole colonies of them. The lichen-covered rocks above the shore are his favourite resting-place, and here he can sit and bask in the sun, and once he has closed his wings he may be said to have disappeared, so beautifully does the under side of his wings blend with the colour of the surrounding rocks. He shows a certain amount of wisdom, too, at times, for if you make a stroke at him with a net and miss, he is off to sea, flit-flitting just above the water, and making a wide détour before coming back to land.

The wings are brown, with an irregular light tawny band, in which, on the fore-wing, are two eye-spots, and on the hind-wing only one. But the finest ornamentation is on the under side of the hind-wings, which bear a strong resemblance to a granite rock speckled with lichens.

The caterpillar, I think, feeds mostly at night, as I

have found it during the day under stones in hilly districts near the sea. It is variable in colour—brownish to black, with a few lighter lines on the back and sides, and it has a dirty putty-colour on the under side. It feeds on grass in May. The butterfly is out from July to September. It appears in August in Scotland.

THE MEADOW BROWN BUTTERFLY (*Epinephele Janira*), Plate IX., Fig. 7.—Perhaps this is the commonest of all our brown butterflies. On roadside or hillside, moor or meadow, one can hardly fail to notice this homely brown insect all through the summer rambles. The males are smaller and dingier than the females. They have an obscure reddish patch on the fore-wing which, with an eye-spot, relieves the upper surface of dark brown. The females are brighter and often more variable, the fulvous patch on their fore-wings being large and bright, and even extending into a band on the hind-wings. There is occasionally an inner patch of suffused yellow on the centre of the fore-wings; the under side is a paler brown, with a decided band of grey-brown on the hind-wing, which is also slightly scalloped.

The caterpillar is a delicate green, with a white line on either side, and may be swept from moorland grasses in May and June. The chrysalis is short and dumpy; pale papery grey, rather fragile, and is hung up by the tail to a grass-stem. The butterfly is out practically all through the summer.

THE SMALL MEADOW BROWN (*Epinephele Tithonus*), Plate IX., Fig. 8.—Also a common species, but does

not so range far north. Wings, a bright tawny red inclining to yellow, bordered with dark brown, with an indistinct diagonal bar across the wings in the male. There is also a black spot near the tip of the fore-wings containing two tiny white spots; occasionally there are two small eye-spots on the hind-wings also. The under side of the hind-wing is shaded with red-brown and pale ochre, and bears a few small white spots surrounded by red rings. Under side of the upper wing is pale tawny yellow with outer edge dark; there is a black spot at the tip with *two* white dots in it.

The caterpillar varies from green to grey-brown; there is a dark red line along the back, and two light lines run along each side. It is a grass-feeder, and prefers a drier situation than the last species. Perhaps this is the reason for it being found in Ayrshire, the driest and sandiest county in Scotland. July and August are the butterfly's months.

The Ringlet Butterfly (*Epinephele Hyperanthus*), Plate IX., Fig. 9.—This is a common and not very attractive-looking butterfly. Its colours, if it can be said to have any, are dingy in the extreme. The upper surface is a dark sooty-brown hardly relieved by a few faint eye-spots, which are very small and not always present. A dirty white fringe completes the upper side. The under side affords some compensation, however, for here we have the ringlets in some variety —pale yellow for the outer ring, which encloses black with a white spot in the centre. They are arranged three on the upper wing and five on the lower. They

vary in size, as will be seen from the figure (Plate XIV., Fig. 9). It is not a very lively insect; it frequents dry pasture-fields in Scotland, preferring those bordering the sea.

The caterpillar is like the last species, but a greener grey; it feeds on grasses. The butterfly is out in July. When you do happen upon this species, keep a sharp lookout for varieties, as it has quite a range of well-known "sports"; the variation is mostly on the under surface.

The Marsh Ringlet (*Cænonympha Typhon*), Plate IX., Fig. 10.—This insect has to be sought for on the swampy moorlands and mountains of the North. It is of a dingy fawn-colour, sometimes brighter, often as if it had been held over the fire and "Peat-reekit." It is somewhat remarkable what a number of creatures inhabiting this same region have gradually come to assume a similar coloration. Many of the Highland cattle on these moors have this dirty tawny-yellow tint; the deer and the hare find protection under the same guise. The upper surface of the Marsh Ringlet is varied with a few eye-spots, though I possess specimens with no spots at all, while others have four on each of the hind-wings and two on each of the fore-wings. The under side is generally better marked by eyes, six forming a row round the outer margin of each hind-wing, of which the first and last are usually the largest; fore-wing under side—two eye-spots, the one nearest the tip being the larger. There is also a light bar across this wing, and this is continued on to the hind-

wing, where it broadens out and is irregular and often interrupted. The ground colour here is a subdued green-grey, getting lighter towards the fringe. Females have more ample and rounded wings than the males. I find the most comfortable way to hunt this butterfly is with bare feet and legs, and the trousers well tucked up, which will perhaps convey some idea of the nature of the ground it loves to flit over. Splash, splash you go over the *Sphagnum* and Cotton-grass, Heather and Marsh Wortleberry, while overhead the eerie cries of the curlew and the lapwing remind the naturalist that there are many young families hidden amongst the Heather, who will rejoice when they see the last of him and that fearful net of his.

The caterpillar is green, with white lines, and feeds on Cotton-grass in May. The butterfly appears towards the end of June.

The Small Heath Butterfly (*Cænonympha Pamphilus*), Plate XII., Fig. 1.—This can be best described as a smaller and brighter edition of *Typhon;* occasionally a *large* specimen may even be mistaken for a *small Typhon*, but you can always tell the smaller species by the presence of only one eye-spot on the tip of the fore-wing, and no eye-spots anywhere else. Its habits, too, are different, preferring, as it does, a much drier and more pastoral country to sport over. And its range is also wider, being found all over the country from June till September.

The caterpillar is green and a grass-feeder. I have swept it from grass in August.

THE BROWN HAIRSTREAK (*Thecla betulæ*), Plate XII., Fig. 6.—There are five British species included in the very distinct group of interesting little butterflies, to which this species belongs. All of them are nearly black on the upper surface, but the undersides are exceedingly chaste in pattern, if not showy in colour. The Brown Hairstreak is the largest of the five. The male is a dark brown relieved by a lighter spot edged with black on the fore-wing, and the bottom angle of the hind-wing and the little tails are orange. The female has an orange bar across the fore-wing. The under side (Plate XIV., Fig. 7) is a tawny orange inclining to deep orange at the margins; a double white irregular line edged with black runs across the hind-wings, and between these lines the tawny shade is darker; the fringe is white.

The caterpillar is green, marked with diagonal yellow lines and tapers considerably towards each extremity. It feeds on Birch and Blackthorn. Though by no means a common insect, it is found in a great many localities from North to South of England, but not in Scotland. The butterfly is out in August.

THE WHITE-LETTER HAIRSTREAK (*Thecla w-album*), Plate XII., Fig. 4.—A smaller and, on the upper surface, a blacker insect than the last. Excepting for a small indistinct spot in the centre, and near the outer margin of the fore-wing, the upper surface is devoid of markings of any kind. The under side, however, provides all the distinctive features necessary for identification. The colour is a cool brown-grey, the

fore-wing being traversed by a white line; the hind-wing has a similar white line, which forms a W at the basal angle; under it is a broad orange scalloped band, edged with black and white; the extreme outer edge is black, and this black edging scallops into the orange band. Tail black.

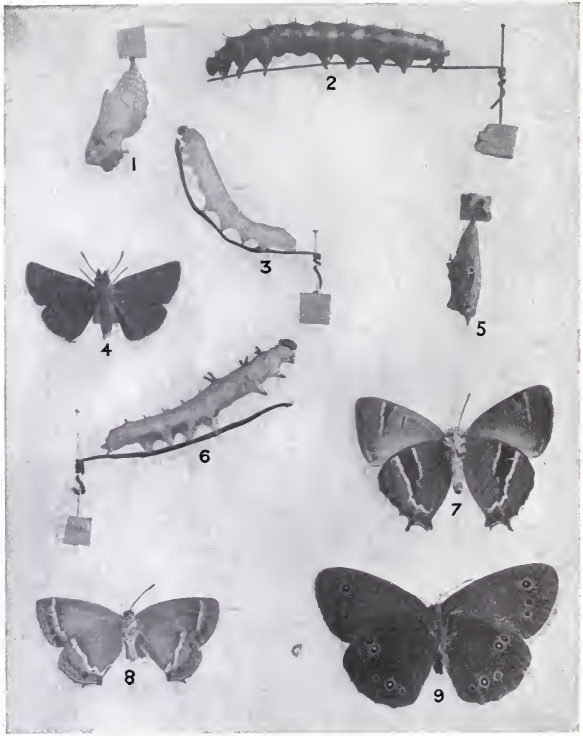
The caterpillar feeds on Elm; is pale green, with yellow bars and two rows of whitish humps along the back. It may be got by beating the Elm in early summer. The Butterfly appears in July, but is far from common, York being about its northern limit.

The Black Hairstreak (*Thecla pruni*), Plate XII., Fig. 5.—About the same size as the last, but many individuals are smaller. The ground colour is almost black, but near the tail are two or three conspicuous orange spots, which are not present in *w-Album*. The orange band on the under side of the hind-wing is much bolder and is edged with black spots on *both* sides, the inner row of spots being partially ringed with white; the white hairstreaks are fainter and slightly interrupted. This is the rarest of the group, and confined to a few localities in the South and South-East.

The caterpillar is green, with yellow spots and lines; it is found on Sloe and Oak. The perfect insect is out in July.

The Purple Hairstreak (*Thecla quercus*), Plate XII., Fig. 3.—The commonest and most widely distributed of the Hairstreaks extending well into Scotland where, however, it is not common. The upper surface in the male is shot with purple, while the female

PLATE 14



1. Pupa of Red Admiral
2. Larva of Red Admiral
3. Larva of Small White
4. New Small Skipper
5. Pupa of Small White (showing hole through which ichneumons emerged)
6. Larva of White Admiral
7. Brown Hairstreak (under side)
8. Purple Hairstreak (under side)
9. Ringlet (under side)

has a patch on either fore-wing of a still more pronounced sheen. The under side (Plate XIV., Fig. 8) is a cool grey; the "hairstreak" is white and strongly defined by an inner edging of dark brown. There are also two orange eye-spots near the tail, which in this species is rather small.

The caterpillar is a reddish-brown and grey mixture, with a lighter angular pattern along the back, and a light line along the sides. It feeds on Oak.

I once came upon a small colony of this little butterfly flying round some Oak-trees in Argyllshire, but not one of them came lower than 15 feet from the ground, and after trying a variety of expedients I had to retire discomfited without a single capture. A visit to the same spot on subsequent days failed to reveal a single specimen. August was the month. In the South it is out in June.

The Green Hairstreak (*Thecla rubi*), Plate XII., Fig. 2.—The smallest of the British Hairstreaks and a fairly common species. Deep dingy brown above, bright emerald-green below, traversed by white hairstreaks, although in some specimens I have taken these white lines are absent. An elusive little butterfly, as when it settles amongst green herbage with the wings closed it is rendered almost invisible, so well does it harmonize with its surroundings.

The caterpillar is green, spotted and striped with yellow; it feeds on Bramble and Broom. The butterfly is out in June generally, but I have found it in the closing days of May in a favourable season. In the

South a second brood appears in August. It reaches as far north as Perthshire, and is frequently met with in the West Highlands.

The Large Copper Butterfly (*Polyommatus Dispar*), Plate XII., Fig. 7.—I am afraid there is now only one British locality where this fine butterfly can be successfully pursued. Strange to say it is not one of the few places where it was found so abundantly a century ago. Neither is it any use going after it there with a net, or any other of the usual appliances.

The correct place and method are no great secret, being, as it is, in the very heart of London—to wit, Stevens' Auction Rooms, King Street, Covent Garden. A cheque-book there is a more reliable, and, if properly handled, sure means of bringing a specimen into one's collection. I don't suppose there is anybody now alive who remembers having seen the Large Copper flitting about its native Fen lands so long ago as 1850 or thereabout, for the precise date is difficult to discover. The Large Copper has become as extinct as the dodo or the great auk. Fortunately, many specimens are still to be seen in old and well-preserved collections, and not a few of these have already passed through the hands of the auctioneer. There are various Continental "Coppers" which more or less resemble the "dear departed." And it is as well that the points of difference should be well known, as these foreigners can be had for a few pence. *Dispar* sells at as many pounds.

The male and female differ very much from each other, the male being a clear scarlet copper tint, with

black margins and a small black spot in the centre of the fore-wing. The female is larger and not so brilliant; the black marginal band on the fore-wing is broader, and has a row of black spots in addition to the central black spot. The hind-wings are much dingier, except for a brighter band round the outer margin next the black outline. It was out in July and August in the Fen lands of the south-eastern counties. Various causes have been assigned as the reason for its disappearance. Draining of, and burning rubbish on, these wastes, and the constant persecution the insect had to endure from mercenary natives who, once they discovered there was money in it—and the more money, doubtless, the scarcer it became—all lent their quota of assistance towards finally exterminating this fine butterfly.

The Small Copper Butterfly (*Polyommatus Phlæas*), Plate XII., Fig. 8.—Less in size but hardly less brilliant in colour, the Small Copper is not likely to share the fate of its larger relative. A lively, restless, little imp it is, and has well earned the title of "the flea," by which it is known in some districts.

As it is the "only Copper we possess now," a detailed description is unnecessary, but I would direct the young collector's attention to the fact that there are some nice variations of this common little species apt to be overlooked, perhaps the most striking being a white form, and another and commoner one having a row of blue spots on the upper surface of the hind-wings.

The caterpillar feeds on various species of Sorrel, and is green with three red lines.

There are several broods in the year, but it is generally more abundant in the autumn. Found everywhere.

The Long-Tailed Blue (*Lycæna Bætica*), Plate XII., Fig. 9.—While there is no doubt this lovely little blue has been repeatedly taken on our shores, the fact remains that we must still regard it as an occasional visitor only. It may, and we all hope it will, yet be classed amongst our resident fauna. From what we know of it, it seems to have a more than usually wide range; it is recorded for Europe, Africa, Western Asia, East Indies, and Australia. The male is a deep blue, with two black spots just above the tails ; the female shows more brown. The under side is quite different from that of any of our native blues, being barred and spotted in white, and two shades of fawn-brown, with two green spots near the tail. A lookout for it may be kept all along our south coast during July and August.

The Silver-Studded Blue (*Lycæna Ægon*), Plate XII., Fig. 10.—In all of the group to which this insect belongs, numbering about ten species, the males differ very much in colour, especially on the upper surface, from the females. The males are nearly always blue of various shades, and the females brown and blue in varying proportions.

In *Ægon*, the male is a warm violet-blue, the outer margins being bordered with black. The female is brown shot with blue, which becomes more intense near the outer margin of the hind-wings, where there is a row of orange spots touching an outer row of black spots ; but these two rows may be nearly or altogether

absent. The under side (Plate XV., Fig. 4) is banded with orange and black-spotted, the black spots being ringed with white. The silver studs are on the outer margin of the orange band, principally on the hind-wings. This is a fairly abundant species all over England on dry soils, and has been met with in Scotland. The caterpillar is green, sometimes brown, with a darker line along the back and white lines on the sides. It feeds on Clover, Vetch, Broom, and other leguminous plants. The butterfly is out in July and August.

The Brown Argus (*Lycæna Astrarche*), Plate XII., Fig. 11.—Here is a "blue" in which *both* sexes are brown, a rather unusual thing. In every other particular, however, it bears the family hall-mark. The upper surface is dark brown, bordered with bright orange spots. The under side (Plate XV., Fig. 6) is banded with orange and spotted with black dots ringed with white. For the Scotch variety, *Artaxerxes*, these spots are solid white, and there is in addition a *white discoidal spot* on the upper side of the fore-wing. This variety is local in Scotland, but fairly numerous where found, generally near the sea, and plentiful all along the Ayrshire coast in June and July. It is said to feed on *Helianthemum*, but has probably many other food-plants, such as the Hemlock Stork's-bill (*Erodium cicutarium*), which is common where it flies.

The caterpillar is green, with a darker line along the back, and a pale line on each side; head black and shining. There are many intermediate forms between *Artaxerxes* and the type.

THE COMMON BLUE (*Lycæna Icarus*), Plate XII., Fig. 12.—Known to everyone who sees anything at all of the country. It is *the* blue butterfly, noticed even by those who hardly know a butterfly from a bull-frog.

An intelligent little chap he is, too, with an eye for his own safety, as I once found when I had the opportunity of observing quite a number of them on a piece of waste ground near the sea. The weather was dull and threatening rain, and not a butterfly was on the wing; but I could see plenty of our common blue friend hanging on, with closed wings, to the ends of rushes, grass-stalks, and on thistle-tops; but always when I came within a step or two they adroitly changed their position, putting whatever they were resting or hanging on between us, just edging round the corner as it were, so as to be out of sight. Apparently the idea of *flying* away from an enemy was here considered as too risky under the conditions which prevailed; the safest plan was to hide, so hide they did. It was the funniest game of hide-and-seek I ever played. I have since seen the small blue dragon-flies adopt the same tactics on the rushes by the side of a pond. No wonder this little fellow is so common. In the struggle for existence he has shown himself able and well-fitted to survive; nevertheless I had a good time amongst them that afternoon and boxed some fine varieties. The male bears a warm shade of blue, and the female is from nearly black to brown, with a blue blush spreading from the body outwards, both wings being bordered

with a row of orange and black spots, often on a ground of white. Sometimes, too, there is a discoidal black spot edged with white; but the females are very variable. The under side (Plate XV., Fig. 5) has the characteristic markings of the "blues," and, excepting that the female is a little darker in ground colour, both sexes are pretty much alike.

The caterpillar is green, with a dark line on the back, and a light yellow line on each side; it feeds on Trefoil and Clover. The perfect insect is common everywhere from June till August.

THE CLIFDEN BLUE, OR ADONIS BLUE (*Lycæna Bellargus*), Plate XIII., Fig. 1.—It will be sufficient to point out the specific characters of each of these blues without going into minute detail, which would be wearisome, even if it were possible (which it is not) to paint in words what Nature has painted so admirably on the butterflies' wings. The male Adonis is a brilliant azure blue; fringe, deep and white, and divided into sections by black lines. Female, brown to nearly black, with a row of orange and black spots round the base of the hind-wing and sometimes continued faintly into the fore-wing; it is browner on the under side than the male. Both resemble the Common Blue very much, but the spots are scarcely so numerous or so bold. The wings, however, are generally more ample, those of the males being more rounded.

The caterpillar is green, with a darker line on the back, and a yellow line on each side; spotted with orange on the back. This is a fairly common species

confined mostly to the South, where, being double-brooded, it is out in June and August.

The Chalk-Hill Blue (*Lycæna Corydon*), Plate XIII., Fig. 2.—A larger insect than the last, and the male an extremely pale iridescent blue, which is shaded off at the margins into a black border, with a white fringe checked with black. Female, dark brown, black and white checked fringe; eye-spots nearly obsolete along the margin of both wings. Under side in male almost white, shading to pale green, blue next the body on the fore-wing; hind-wing, with a wash of pale brown for the ground; spots black, outlined with white. A marginal row of orange spots is confined to the hind-wing in the male, but extends to the fore-wing in the female; the ground colour of it, however, is a pale fawn, which sets forth the eye-spots beautifully.

The caterpillar is green, striped on the back and sides with yellow. A decidedly southern species, frequenting the chalk downs of the South and the Isle of Wight, or the limestone districts of the Midlands. It is out in July and August.

The Azure Blue or Holly Blue (*Lycæna Argiolus*), Plate XIII., Fig. 4.—This is a very dainty little butterfly of a deep sky-blue, with rounded wings narrowly fringed with white, ticked with black. The female has a broad, irregular, black border, occasionally extending well into the wing. But the under side (Plate XV., Fig. 3) marks a new departure, being of a very pale, shimmering blue, with only a few small, black spots, which form an incomplete row on fore- and hind-wings.

1. Brown Argus (var. *Artaxerxes*)
2. Brown Argus (var. *Artaxerxes*) (under side)
3. Azure Blue (under side)
4. Silver-Studded Blue (under side)
5. Common Blue (under side)
6. Brown Argus (under side)
7. Mazarine Blue (upper side)
8. Mazarine Blue (under side)
9. Chalkhill Blue (under side)
10. Large Blue (under side)
11. Little Blue (under side)

The caterpillar is green, with a dark line on the back, and a black head. It feeds on the *flowers* of Holly, Ivy, and Buckthorn.

Being double-brooded, the perfect insect appears first in April and May, and again in August. It is generally distributed in England, though commonest in the South; not known to occur in Scotland.

The Mazarine Blue (*Lycæna semiargus*), Plate XV., Figs. 7 and 8.—Males, a very dark purple-blue—in fact, this is our darkest "Blue," and shares the distinction with the Long-Tailed Blue of being extremely scarce. Possibly those met with now are visitors from the Continent. The blue deepens into a black border at the margins; fringe short and white. Female, a uniform dark brown; under side a pale buff colour, with an irregular row of black spots edged with white. There are no orange spots on this species. It is said to feed on Thrift; hence it is likeliest to be met with near the coast during July. Good Continental specimens can be purchased cheaply, or got by exchange. And I hold it is better to fill in your row with these, carefully labelling them to indicate their source, than to have an empty space always staring you in the face. Unless this species becomes more common, the average collector's chance of capturing British specimens is exceedingly remote.

The Little Blue (*Lycæna Minima*), Plate XIII., Fig. 3.—The smallest of our butterflies, the average expanse being only $\frac{3}{4}$ inch. Male, blackish-brown dusted with blue towards the base of the wings.

Female, solid brown ; under side (Plate XV., Fig. 11) a pale salmon, blue spotted as in *Argiolus*, with black outlined with white ; no orange spots on either sex.

The caterpillar is dull green, orange-striped on back and sides. It feeds on Trefoils, etc. This species is local, but common all over the British Isles, except in the extreme North. It is one of our early species, appearing in May and June.

The Large Blue (*Lycæna Arion*), Plate XIII., Fig. 5.—This is the largest of our "Blues" and the rarest of our really resident species, and although it appears to be able to hold its own and maintain its numbers fairly well, I would strongly urge collectors to at least let all the "fair" and worn specimens retain their liberty. Again and again I have seen specimens set up and sent out in exchange that should never have been taken. Of a dark blue colour, black-bordered, *Arion* can always be recognized by the row of black spots across the middle of the fore-wing ; they are sometimes very large in size. There is occasionally a row of black spots round both wings, just inside the margin. The under side (Plate XV., Fig. 10) is a pale grey, gradually shading into a bright blue-green next the body, profusedly spotted with black in white rings.

The caterpillar, which feeds on Wild Thyme in the spring, is dark rust-coloured. The butterfly is out in July, and is found mostly in the extreme south-west counties.

The Duke of Burgundy Fritillary (*Nemeobius Lucina*), Plate XIII., Fig. 6.—Very like a diminutive

member of the Fritillary family, but it has no real connection with it, and better still, it has a whole family (*Erycinidæ*) and genus to itself, being the only one of its kind found in Europe. The upper surface is a tawny orange, with dark brown checkerings, while a row of marginal black spots runs round the outer margins. The under side of the hind-wings has a double row of pale, almost white, spots across the centre, and black spots, similar to those on the upper side, round the edge.

The caterpillar is short and tapering, pale brown with a darker line on the back, and a lighter one on the sides. It feeds on Primrose. This species is said to be double-brooded in the South, out in June and again in August as far north as Carlisle and the Lake District. Note: the female has six perfect walking legs, the male only four, the front pair being rudimentary, as with many of the larger butterflies.

The Grizzled Skipper (*Syrichthus Malvæ*), Plate XIII., Fig. 7.—The Skippers, of which there are eight species in this country, are often referred to as the connecting-link between the butterflies and moths, and not without some justification. The antennæ are somewhat short, club-shaped, and *hooked* at the extremity. The head is large, and the antennæ spring from just above the eyes; their base is thus wide apart. Compare a Skipper with a Blue in which the roots of the antennæ almost touch. The body of the Skipper is stout and mothlike, and the wings not so ample, and more angular than in the average butterfly. The

caterpillars live in a rolled leaf or several leaves spun together, and pupate in a slight cocoon.

The Grizzled Skipper is a small butterfly measuring just over ¾ of an inch in expanse. The ground colour is nearly black, checkered with white square spots, as is also the fringe. The under side is lighter.

The caterpillar is a rusty brown, with lighter lines on the back and sides. The species is doubled-brooded, appearing in May and August, and is generally distributed over the country as far north as the South-West of Scotland.

The Dingy Skipper (*Nisoniades Tages*), Plate XIII., Fig. 8.—This is dull grey-brown, and very Quaker-like in its sombre garb, with a lighter and a darker band across the wings. The under side is a pale drab, with a few faint light spots. And truly one may be excused if at times it is mistaken for a night-flying moth.

The caterpillar feeds on trefoil, and is green, with four yellow lines and some black dots ; it is very stout in the middle, tapering to either end. This Skipper is also doubled-brooded, appearing in May and August, generally on dry soils such as the chalk, or limestone, or, as in Scotland, on the sand-dunes of Ayrshire, where it is locally common.

The Small Skipper (*Hesperia Thaumas*), Plate XIII., Fig. 9.—Upper side a uniform tawny-orange shade, with a dark brown or black border. There is also a black dash across the fore-wing of the male, which is absent in the female. On the under side there is a tawny patch along the inner margin of the hind-wing,

and the tip of the fore-wing is light. These are good identification points, as they are fairly stable.

The caterpillar is green, with two white lines on the back and a yellow line on either side. It feeds on grasses in the spring. The butterfly appears in July and is common in England, but is not known in Scotland.

The New Small Skipper (*Hesperia Lineola*), Plate XIV., Fig. 4.—Is very like the last, so much so, that it had been taken for many years by collectors and confused with *Thaumas*. There were few collections that did not possess a mixed series. But once its identity was established, it was soon placed in its rightful position. It may be distinguished from *Thaumas* by the absence of the fulvous patch on the inner margin of the under side of the hind-wings, and also by the absence of the light tip on the under side of the fore-wing. The black dash across the upper side of the fore-wing of the male is fainter, shorter, and more often altogether absent. The under side of the hind-wing is a light buff without marks of any kind.

The caterpillar is a bronze-green, with four yellow lines on the back and one on the sides; it feeds on grasses in damp meadows, mostly in the south and south-eastern counties. The species is local, but common where it occurs. Out in July and August.

The Lulworth Skipper (*Hesperia Actæon*), Plate XIII., Fig. 10.—An extremely local species, being only found in two or three localities on the south coast. It may be distinguished from the two preceding Skippers, first, by its more dingy colour; second, by the female

having a semicircular row of light spots near the tip of the fore-wing. These are very faintly visible in some males, but they have, in addition, a black streak along the centre of the wing. The under side in both sexes is similar, a pale dingy fawn, with no particular markings. The antennæ are very short.

The caterpillar is green, with a dark line on the back, and a double line of yellow on each side. This species may be looked for on rough ground facing the sea during July and August.

The Large Skipper (*Hesperia Sylvanus*), Plate XIII., Fig. 11.—Upper surface tawny-orange shading into darker at the margin of both wings; on this dark margin are a few pale spots, mostly at the tip of the fore-wing. The male has an almost black streak near the centre of the fore-wing; this is not present in the female. The under side is a light tawny olive, with pale lighter spots.

The caterpillar is green, with a dark line on the back, and a light stripe on the sides. It is a grass-feeder. This Skipper is abundant all over England in May and again in August, but is rare in Scotland.

The Pearl Skipper (*Hesperia Comma*), Plate XIII., Fig. 12.—This species is not quite so large as the last. It is darker, and the spot markings are much brighter and more decided. This is the case especially on the under side, as there the spots are bright enough to suggest pearls. Hence the name.

Note, too, the dark streak in the middle of the fore-wing of the male; it is divided along the centre by a

white line. This white line is wanting in the Large Skipper. The dark streak is only on the upper wings of the males. *Comma* is also a more local and scarce insect, being confined mostly to the South of England.

The caterpillar is greyish-red, and has a double dark line on either side; it feeds on various Vetches and Trefoils. The butterfly is out in July and August.

The Checkered Skipper (*Carterocephalus Palæmon*), Plate XIII., Fig. 13.—The upper side of this butterfly is speckled and bordered with tawny-orange spots on a dark brown ground. The under side has a lighter ground colour, and the spots are outlined with dark brown.

The caterpillar is dark, almost black, with a yellow line on the sides, and, as it hibernates over the winter, may be looked for in the spring. It feeds on grasses and Plantain.

This is a very local species, and I am afraid, to judge from reports, becoming rarer. The south and south-eastern counties are the favoured localities.

The Milkweed Butterfly (*Danais Erippus*; variety, *Archippus*), Plate VIII., Fig. 3.—This is an American species, but an occasional visitor to our shores, and, as it is a strong-flying species with the bump of adventure abnormally developed, it is now met with in many lands where it was at one time unknown. I have large fine specimens from Canada, so it can stand the rigours of the Canadian winter; and if it should find a suitable food-plant for the caterpillars here, we may hope, in the near future, to add this fine butterfly to the select little band of British butterflies.

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